APPLICATION GUIDE
FOR USE WITH

HEATING ONLY - 125, 165
&
COMBI - 150, 205

This manual has been prepared for use with the appropriate Installation, Operation and Maintenance Manual.

ECR international

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PN 240011430 REV G, [03/31/2018]

TABLE OF CONTENTS

1. *General*

Boiler installation shall be completed by qualified agency. See Installation, Operation & Maintenance Manual for additional information.

⚠ WARNING

Fire, explosion, asphyxiation and electrical shock hazard. Improper installation could result in death or serious injury. Read this manual and understand all requirements before beginning installation.

2. *Become familiar with symbols identifying potential hazards.*

This is the safety alert symbol. Symbol alerts you to potential personal injury hazards. Obey all safety messages following this symbol to avoid possible injury or death.

⚠ DANGER

Indicates a hazardous situation which, if not avoided, WILL result in death or serious injury.

⚠ WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

3. *Installation shall conform to requirements of authority having jurisdiction or in absence of such requirements:*

- *United States*
  - National Fuel Gas Code, ANSI Z223.1/NFPA 54.
  - National Electrical Code, NFPA 70.
- *Canada*
  - Natural Gas and Propane Installation Code, CAN/CSA B149.1.
  - Canadian Electrical Code, Part I, Safety Standard for Electrical Installations, CSA C22.1

4. *Where required by authority having jurisdiction, installation shall conform to Standard for Controls and Safety Devices for Automatically Fired Boilers, ANSI/ASME CSD-1.*

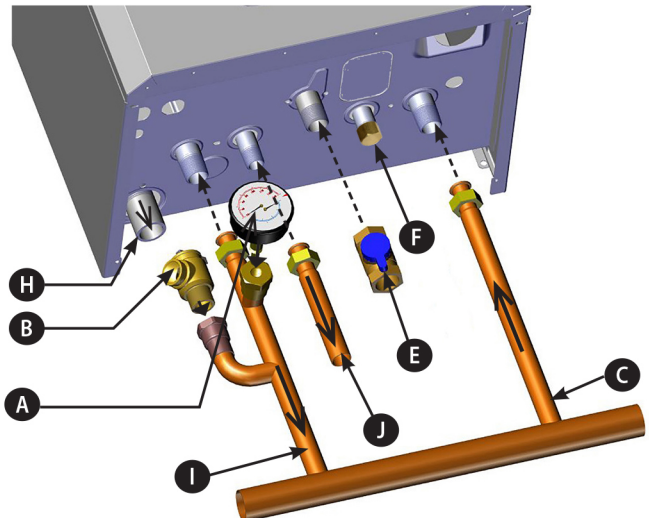
Additional manual reset low water cutoff or high limit may be required.

5. *Requirements for Commonwealth of Massachusetts:*

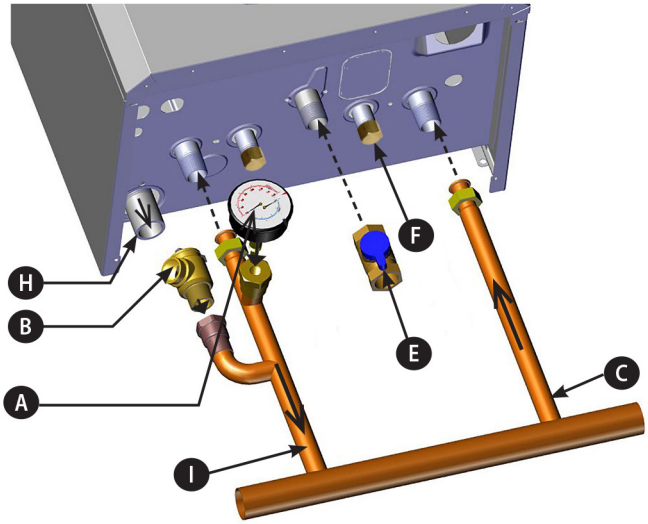
Boiler installation must conform to Commonwealth of Massachusetts code 248 CMR which includes but is not limited to:

- Installation by licensed plumber or gas fitter.

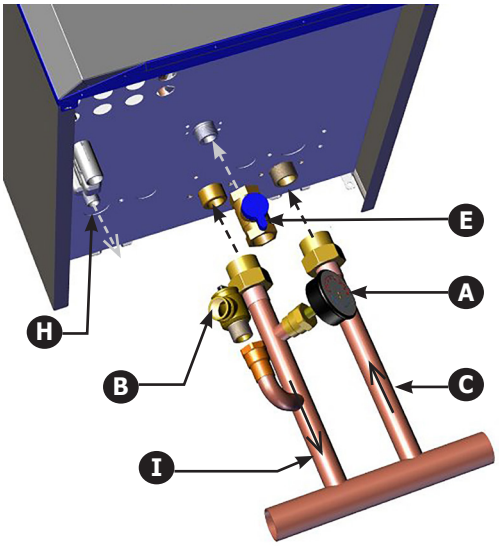
125 HEATING ONLY *WITH* OPTIONAL INDIRECT DHW CONNECTION



125 HEATING ONLY *WITHOUT* OPTIONAL INDIRECT DHW CONNECTION



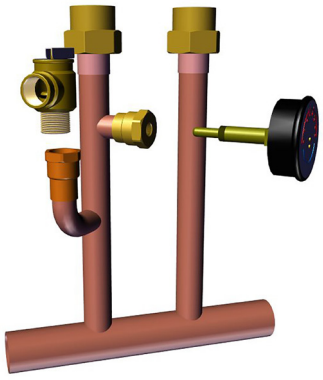
165 HEATING ONLY



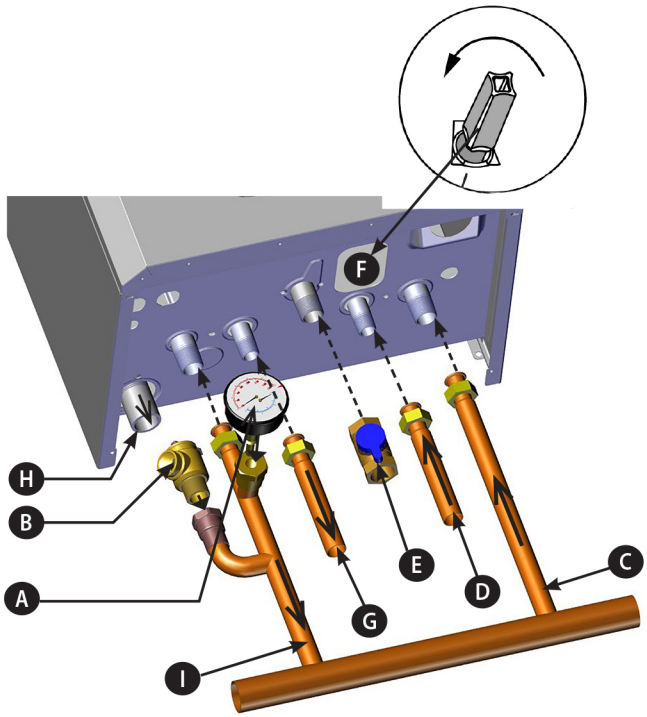
LEGEND		125	165
A	Pressure Gauge	-	
B	Pressure Relief Valve	30.00 psi [2.11 bar]	
C	Heating return connection	3/4" [22.2mm]	1" [25.4mm]
E	Gas shutoff connection	3/4" [22.2mm]	
F	Boiler filling connection (some models)	1/2" [15.9mm]	na
H	Drain connection for condensate	13/16" [21mm] ID Hose	3/4 NPT
I	Heating supply connection	3/4" [22.2mm]	1" [25.4mm]
J	Optional Indirect DHW connection	1/2" [15.9mm]	na

MANIFOLD 125

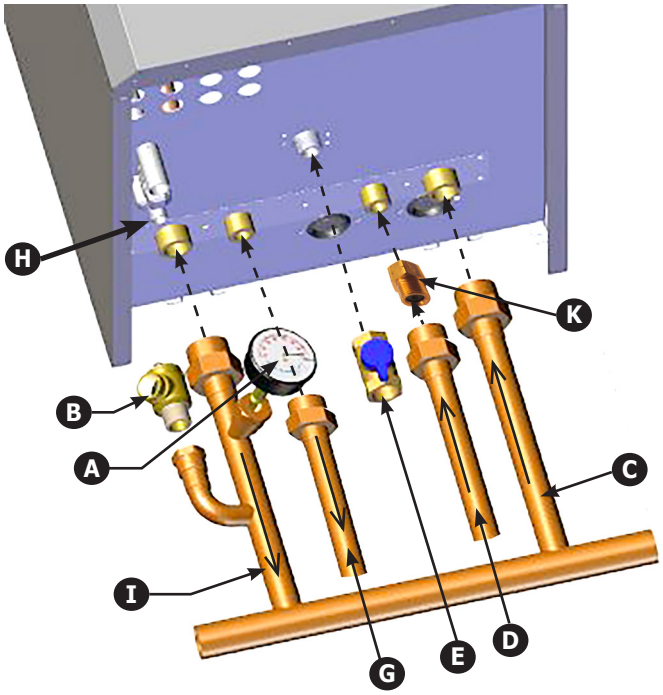
MANIFOLD 165



150 COMBI

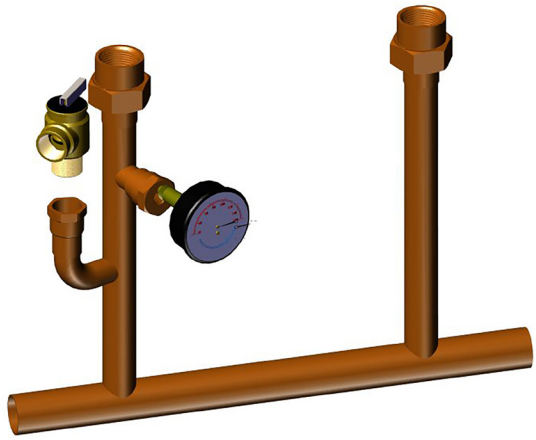


205 COMBI



	LEGEND	150	205
A	Pressure Gauge	-	
B	Pressure Relief Valve	30.00 psi [2.11 bar]	
C	Heating return connection	3/4" [22.2mm]	1" [25.4mm]
D	Cold DHW inlet tap / system filling connection for Combi	1/2" [15.9mm]	3/4" [22.2mm]
E	Gas shutoff connection	3/4" [22.2mm]	
F	Boiler filling connection (some models)	1/2" [15.9mm]	na
G	DHW outlet/indirect storage tank connection	1/2" [15.9mm]	3/4" [22.2mm]
H	Drain connection for condensate	13/16" [21mm] ID Hose	3/4 NPT
I	Heating supply connection	3/4" [22.2mm]	1" [25.4mm]
K	5 gpm DHW flow restrictor (Factory installed) (205 only)	na	3/4" [22.2mm]

MANIFOLD 150/205



⚠ WARNING

Burn and scald hazard! Manufacturer requires installation of field supplied anti-scald valve. Failure to follow these instructions could result in death or serious injury.

General Information:

Piping installation, materials, and joining methods shall conform to requirements of authority having jurisdiction or in absence of such requirements:

- ***USA*** - National Fuel Gas Code, ANSI Z223.1/NFPA 54
- ***Canada*** - Natural Gas and Propane Installation Code, CAN/CSA B149.1

Manufacturer Requirements/Recommendations:

- Manufacturer requires all domestic hot water (DHW) installations use an anti-scald valve. Local codes may require additional equipment (expansion tank, relief valves, etc.) Select and size equipment to suit installation and meet code requirements.
- Use of a water filter on incoming water supply line.
- If the piping manifold is not used the ASME temperature and pressure relief valve and temperature and pressure gauge shall be installed to conform to requirements of the authority having jurisdiction. Refer to appropriate manufacturer instructions for installation requirements.
- If the piping manifold is not used, a primary / secondary piping arrangement is manufacturer recommended. A maximum of 12" of separation between the supply and return pipe (closely spaced tees) of the boiler shall be maintained.
- Limit combined supply and return pipe lengths to maximum linear lengths of 20 ft (6.1 m) between boiler and closely spaced tees, when minimum ¾" NPT pipe size is used. Linear length may be increased if supply and return pipe size is increased to limit pressure drop.

Note Provided Wiring and Piping illustrations are meant to show system concepts only. Installer is responsible for all equipment required by authority having jurisdiction.

Note Arrange piping to prevent water dripping onto boiler.

All piping diagrams are shown with optional DHW Indirect Tank where applicable.

Use of Indirect Storage Tank (DHW):

- ☐ Use either DHW sensor or Indirect Tank Thermostat to interface with boiler. Wire to M2 terminals #9 and #10.
- ☐ Use of booster pump to increase flow rate to indirect tank is not recommended by manufacturer.
- ☐ Locate tank as close to boiler as possible.
- ☐ Size DHW tank, piping, and system to use only internal boiler pump.
- ☐ See available pump/flow rate chart, page 35 of this manual.
- ☐ Change P03 on boiler for application as specified on the wire diagram and Boiler Control section of Installation, Operation & Maintenance Manual supplied with the boiler.

The Labor Saver Piping Manifold, which is supplied with each boiler, is shown with most of the following piping diagrams.

Electical Wiring Information:

All field wiring shall conform to the authority having jurisdiction or, in the absence of such requirements to:

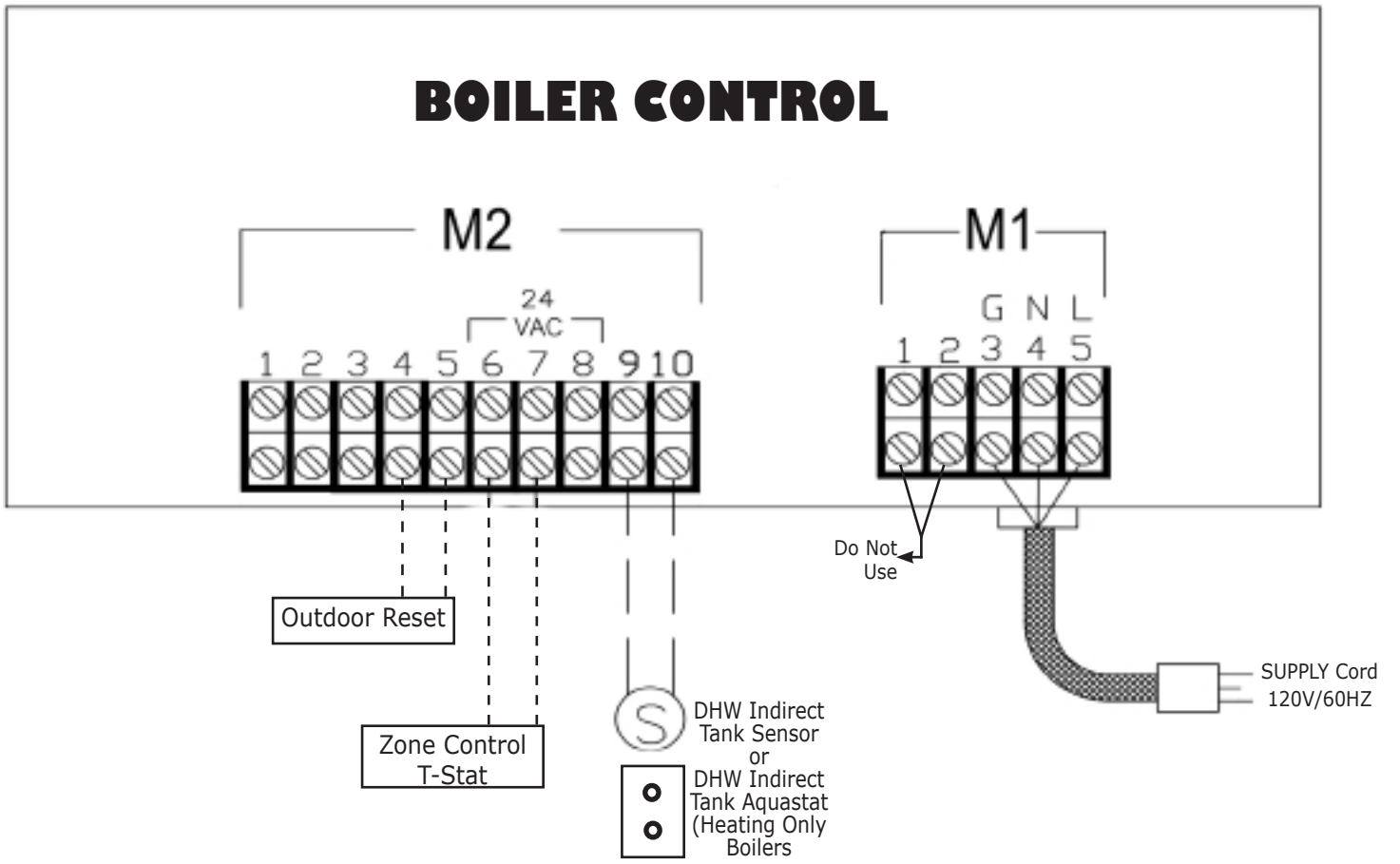
- ***USA***: National Electrical Code, ANSI/NFPA 70,
- ***Canada***: Canadian Electrical Code, Part I, CSA C22.1: Safety Standard for Electrical Installations.

Wiring diagrams shown in this manual utilize the ARGO™ Universal Control, the optional use of an Indirect Domestic Hot Water Tank, and optional use of a H2O Buffer Tank.

Reference the zone control manufacturer instruction manual for control operation and priority sertting of DHW zones.

Note **DO NOT** use 120 V thermostat terminals (m1- #1 and #2).

Note Provided Wiring and Piping illustrations are meant to show system concepts only. Installer is responsible for all equipment required by authority having jurisdiction.



PIPING LEGEND

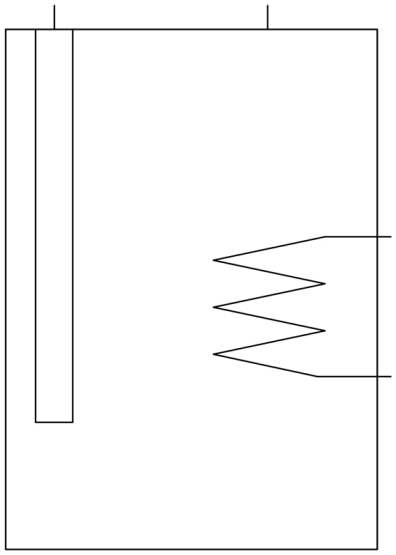
ZONE VALVE

BALL VALVE

AIR SEPERATOR

CIRCULATOR

DRAIN



INDIRECT DHW TANK

COMBINATION FILL

FLOW CHECK VALVE

BYPASS VALVE

DIVERTER VALVE

T&P OR RELIEF VALVE

THERMOSTATIC MIXING VALVE

INDIRECT TANK AQUASTAT

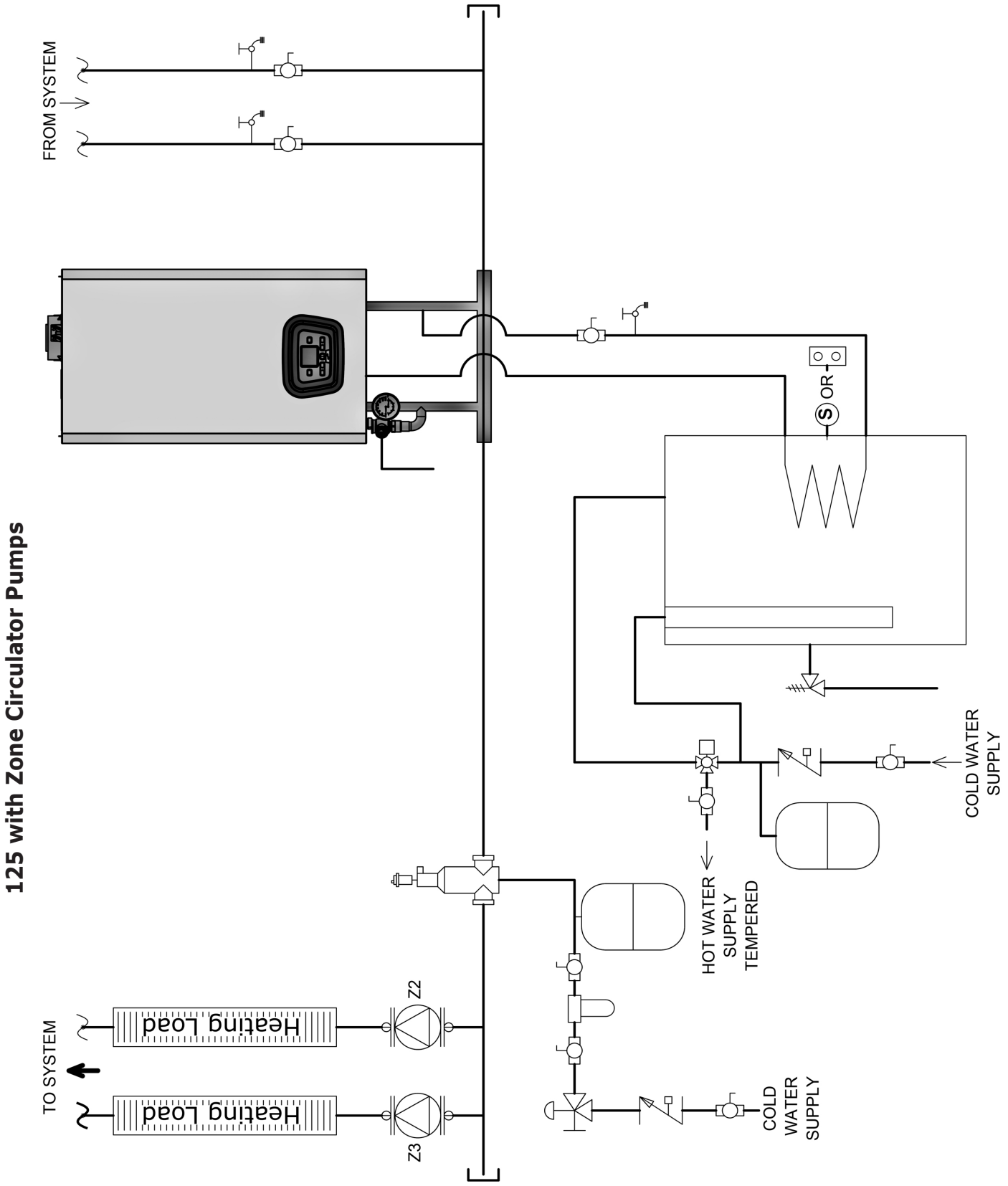
INDIRECT DHW TANK SENSOR

TEMPERATURE & PRESSURE GAUGE

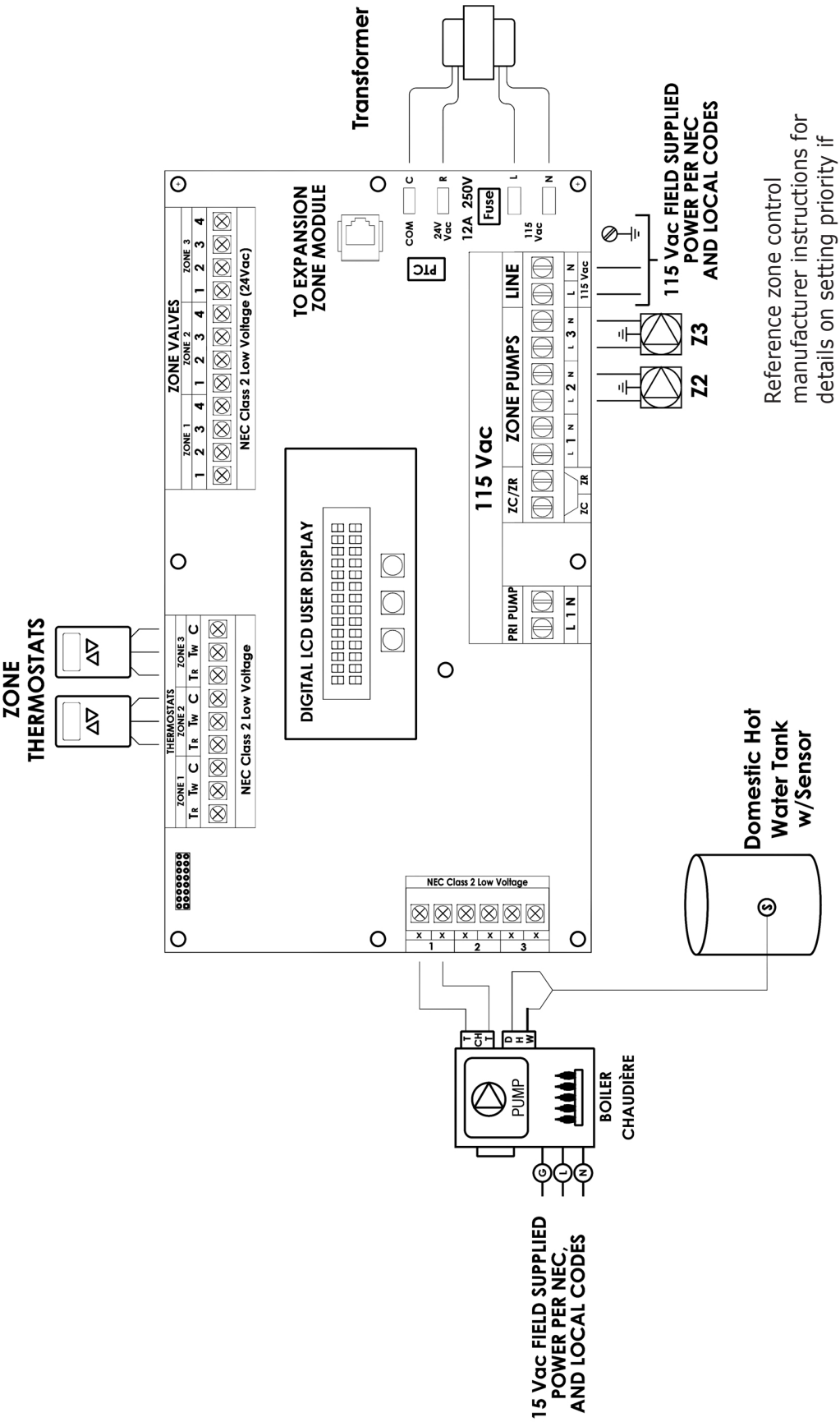
EXPANSION TANK

FLAT PLATE HEAT EXCHANGER
(COMBI ONLY)

STRAINER

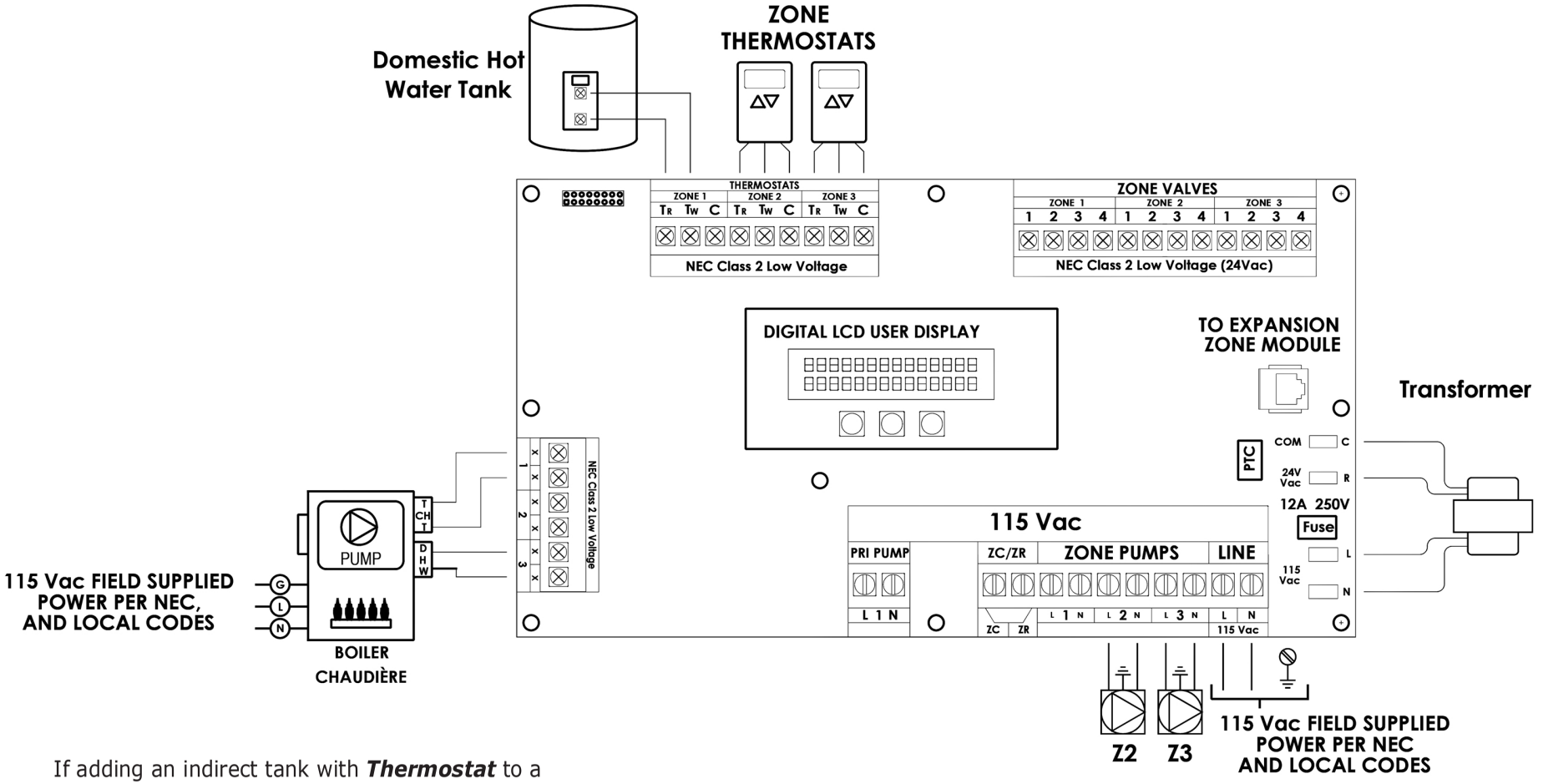

125 with Zone Circulator Pumps
FROM SYSTEM
S OR
COLD WATER SUPPLY
HOT WATER SUPPLY TEMPERED
COLD WATER SUPPLY
Z2
Z3
Heating Load
Heating Load
TO SYSTEM

125 WITH INDIRECT ZONE PUMPS & DHW TANK W/ TANK SENSOR



Reference zone control manufacturer instructions for details on setting priority if necessary.

If adding an indirect tank with ***sensor*** to a **Heating Only Boiler**, change P03 from 08 to 05. See Section 9, Parameter Settings in Boiler Installation, Operation & Maintenance Manual for details.

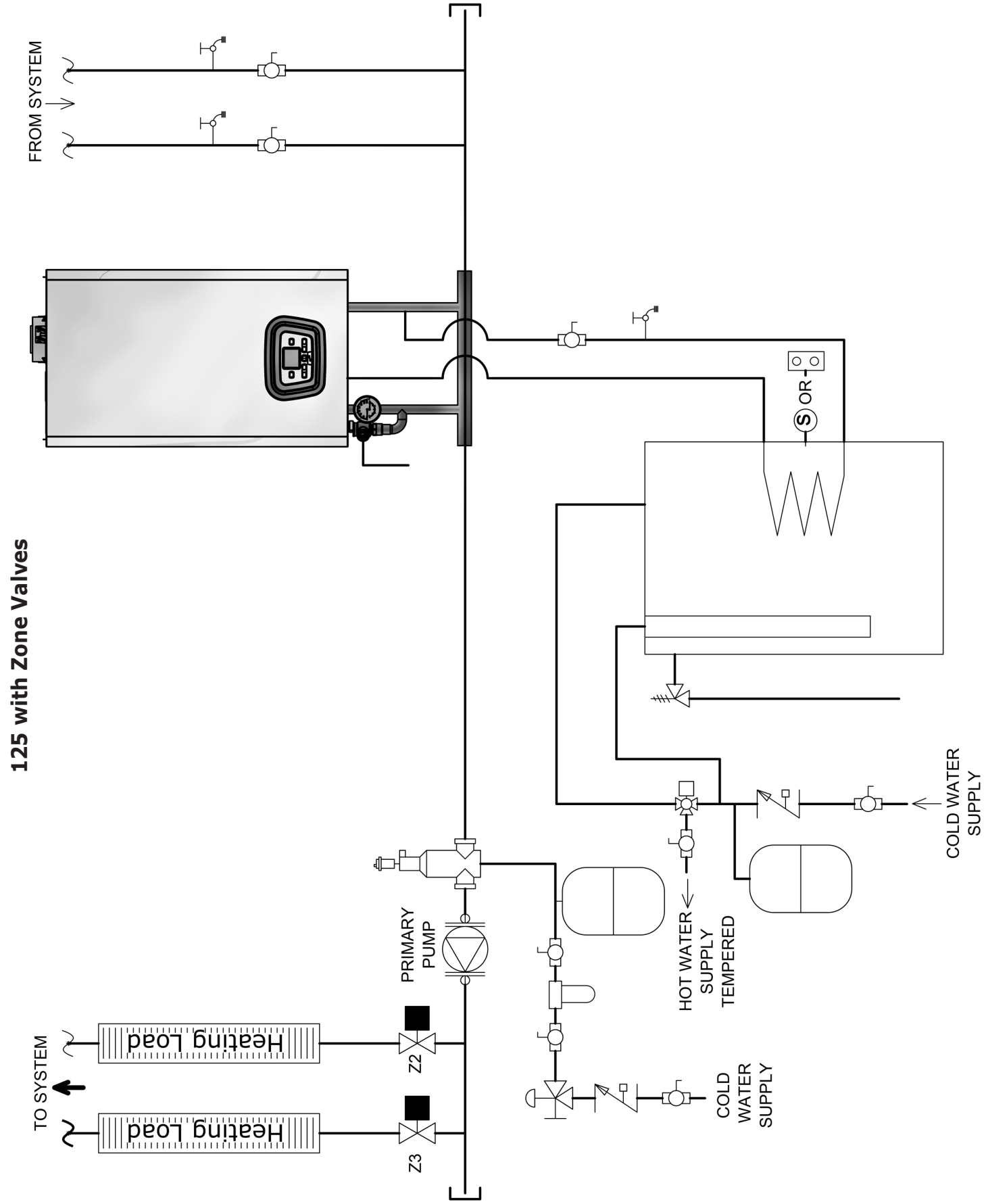


If adding an indirect tank with ***Thermostat*** to a **Heating Only Boiler**, change P03 from 08 to 04. See Section 9, Parameter Settings in Boiler Installation, Operation & Maintenance Manual for details.

Reference zone control manufacturer instructions for details on setting priority if necessary.

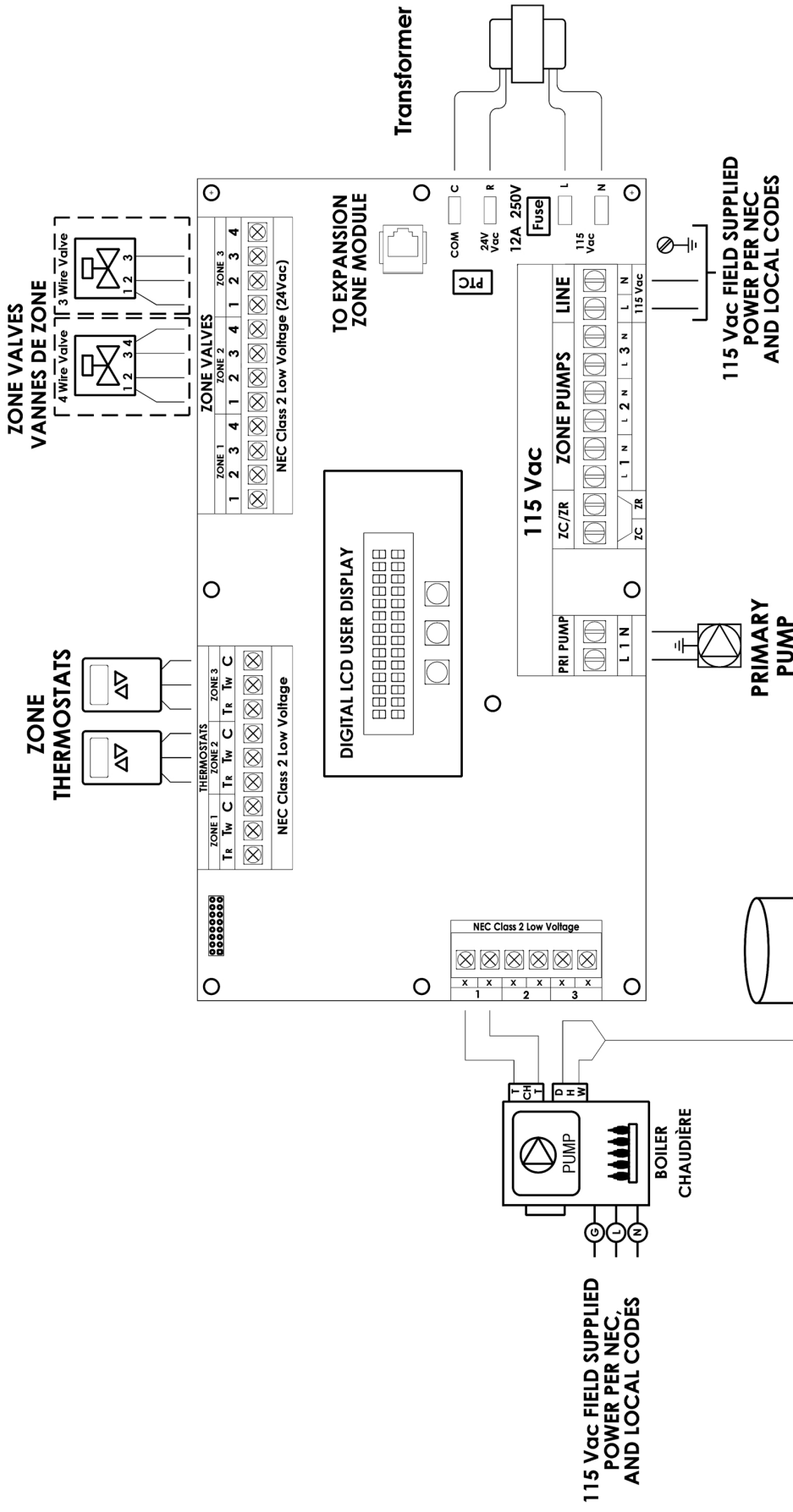
PN 240011430 REV G, [03/31/18]

125 W/ INDIRECT ZONE PUMPS & DHW TANK W/TANK T-STAT - WIRING DIAGRAM


125 with Zone Valves
FROM SYSTEM
OR
S
COLD WATER SUPPLY
HOT WATER SUPPLY TEMPERED
PRIMARY PUMP
COLD WATER SUPPLY
Z2
Z3
Heating Load
Heating Load
TO SYSTEM

125 with Zone Valves

125 With Zone Valves, DHW Tank & Tank Sensor

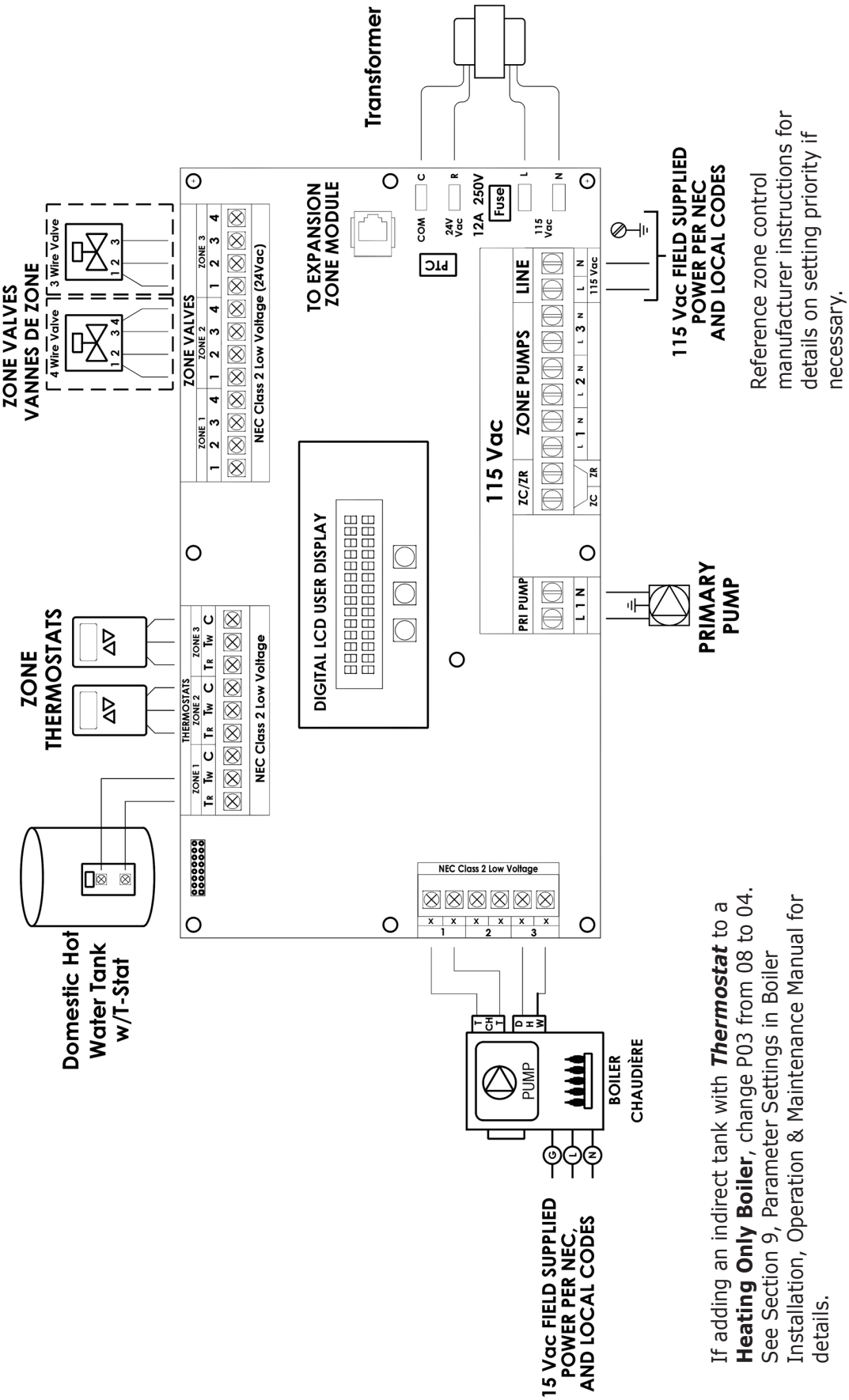


Reference zone control manufacturer instructions for details on setting priority if necessary.

If adding an indirect tank with ***sensor*** to a **Heating Only Boiler**, change P03 from 08 to 05. See Section 9, Parameter Settings in Boiler Installation, Operation & Maintenance Manual for details.

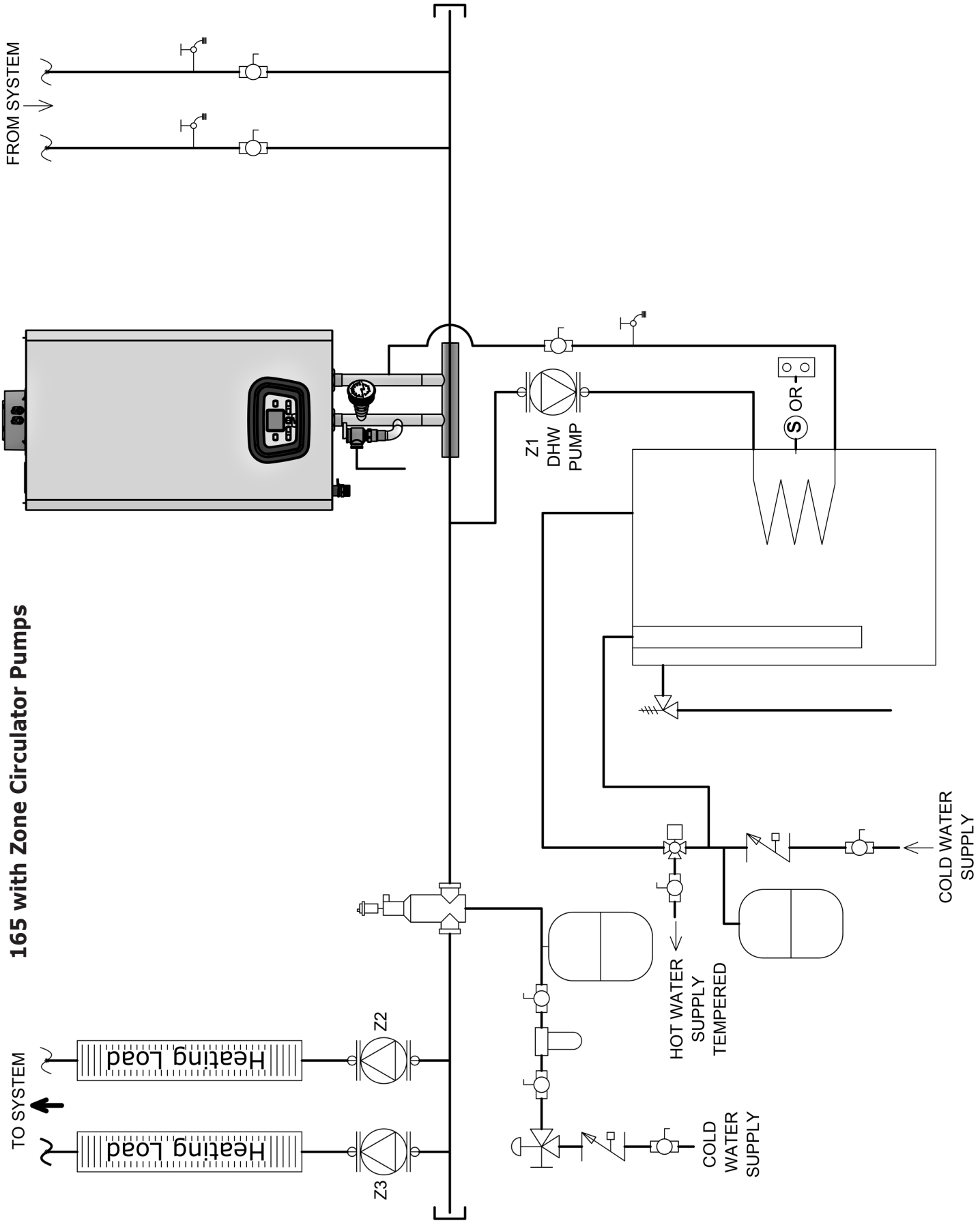
165 Indirect Zone Valves, DHW Tank ,& Tank T-STAT

125 with Zone Valves

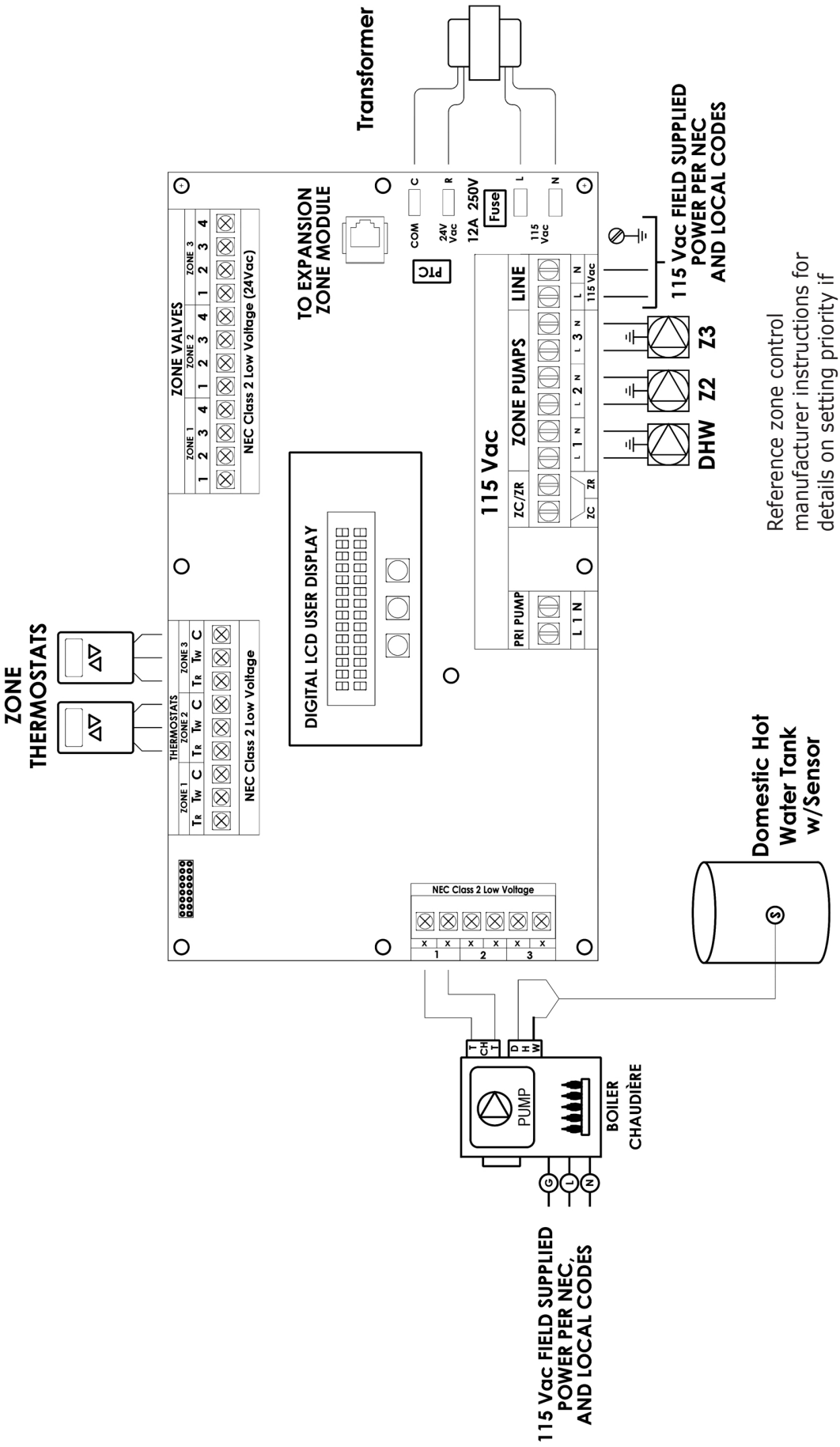


Reference zone control manufacturer instructions for details on setting priority if necessary.

If adding an indirect tank with ***Thermostat*** to a **Heating Only Boiler**, change P03 from 08 to 04. See Section 9, Parameter Settings in Boiler Installation, Operation & Maintenance Manual for details.


165 with Zone Circulator Pumps
FROM SYSTEM
TO SYSTEM
Heating Load
Heating Load
Z1
DHW
PUMP
Z2
Z3
S
OR
HOT WATER
SUPPLY
TEMPERED
COLD WATER
SUPPLY
COLD
WATER
SUPPLY

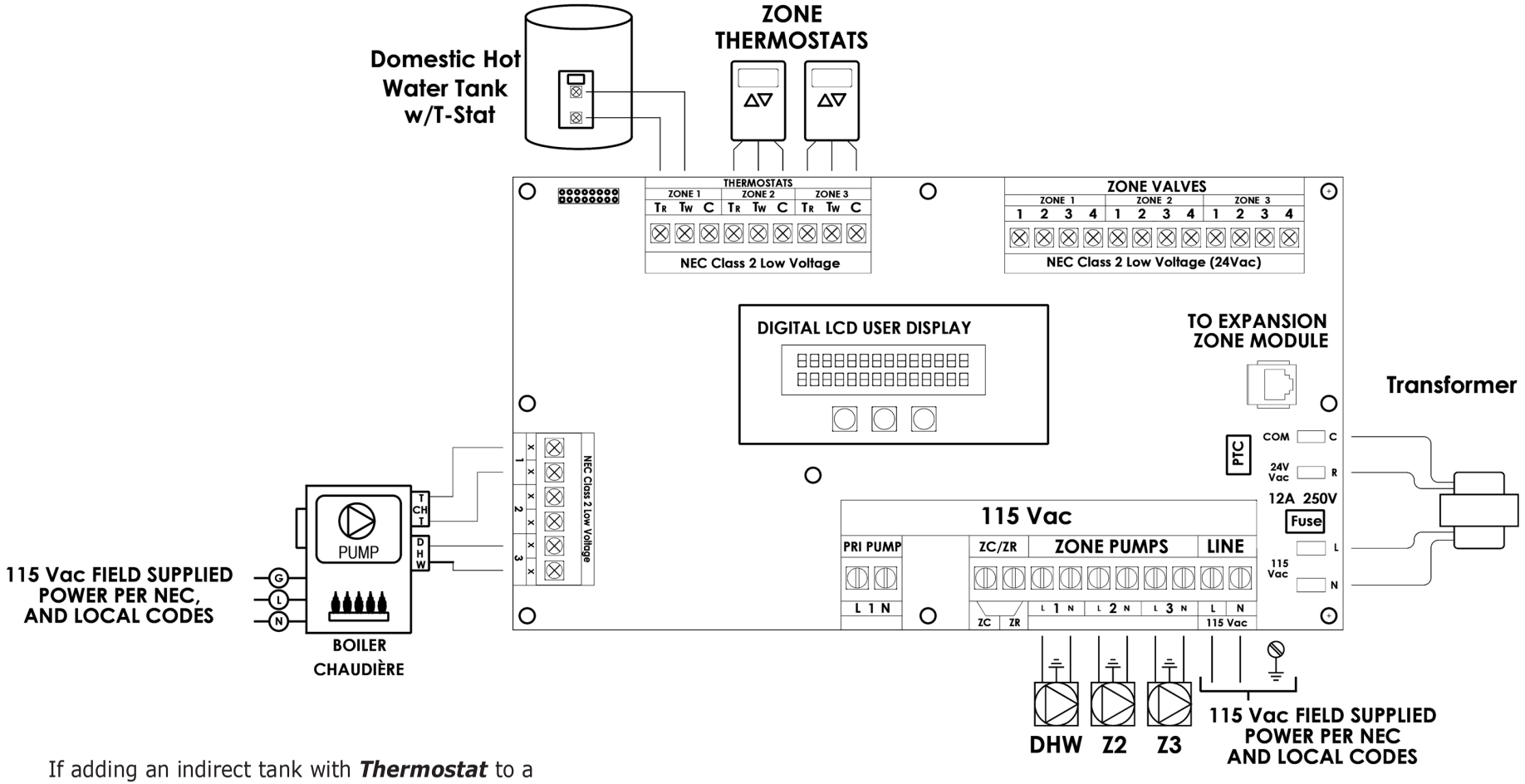
165 Indirect Zone Pumps, DHW Tank, Tank Sensor



Reference zone control manufacturer instructions for details on setting priority if necessary.

If adding an indirect tank with ***sensor*** to a **Heating Only Boiler**, change P03 from 08 to 05. See Section 9, Parameter Settings in Boiler Installation, Operation & Maintenance Manual for details.

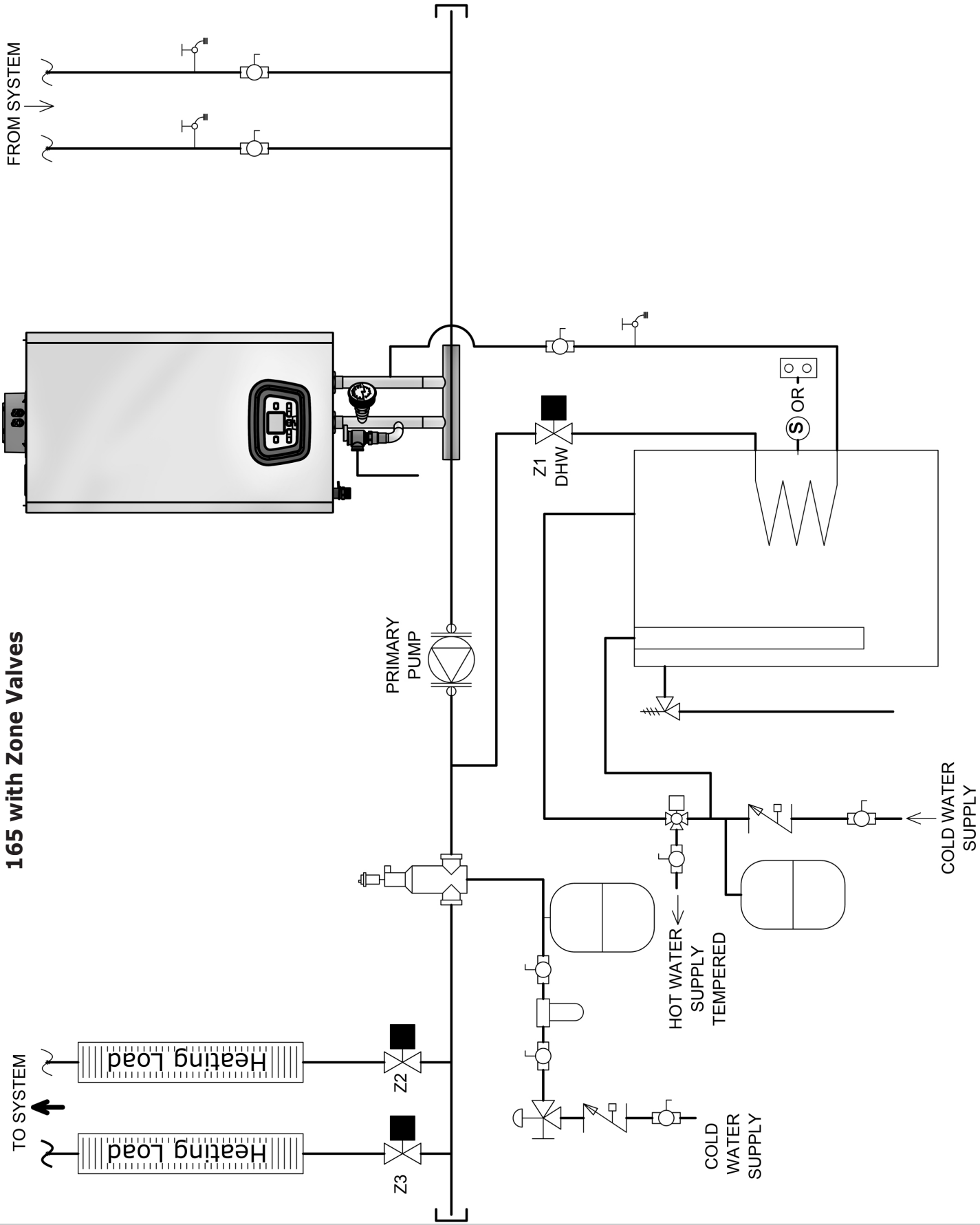
165 Indirect Zone Pumps, DHW Tank, Tank T-Stat



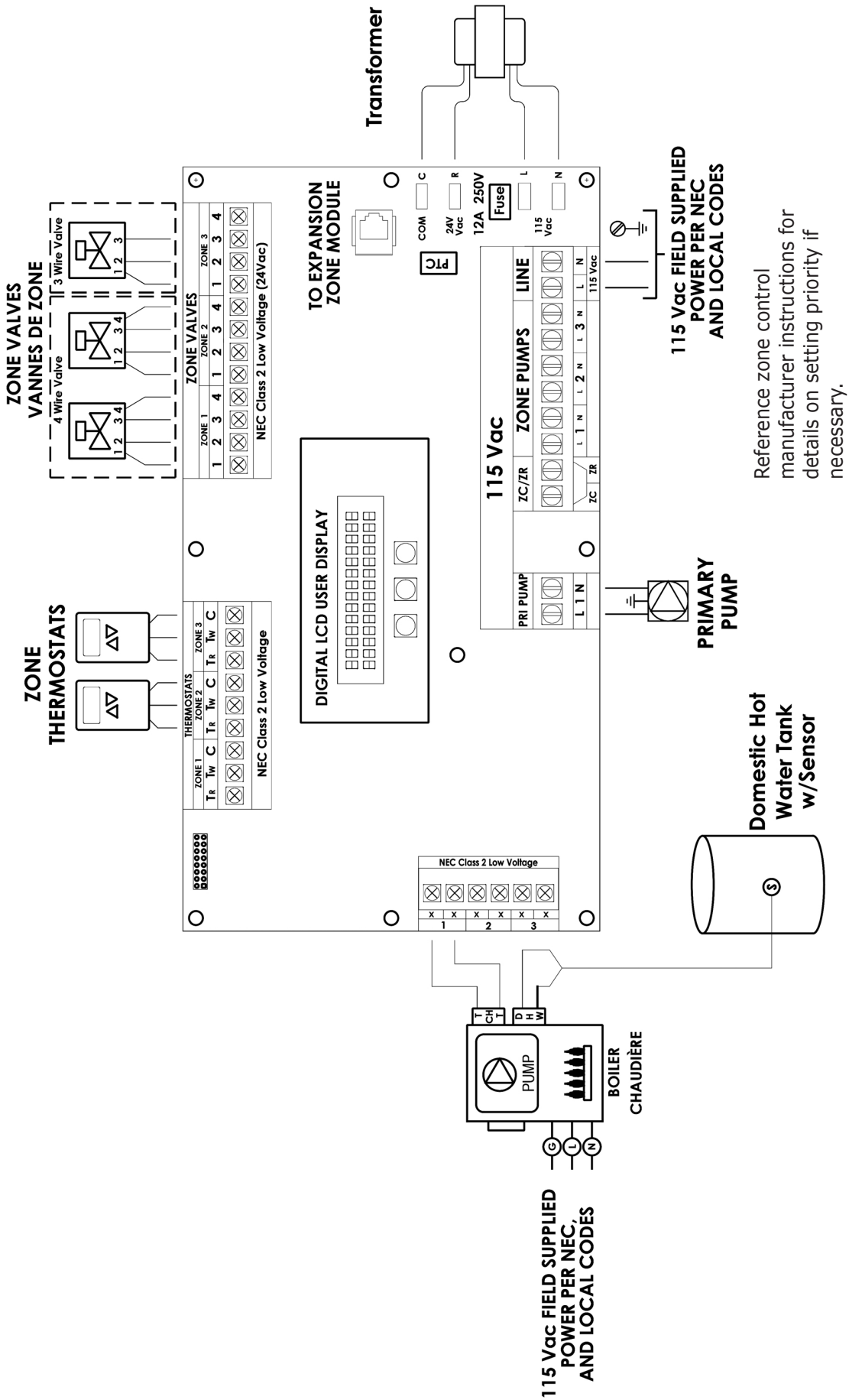
If adding an indirect tank with ***Thermostat*** to a **Heating Only Boiler**, change P03 from 08 to 04. See Section 9, Parameter Settings in Boiler Installation, Operation & Maintenance Manual for details.

Reference zone control manufacturer instructions for details on setting priority if necessary.

PN 240011430 REV G, [03/31/18]


165 with Zone Valves
FROM SYSTEM
TO SYSTEM
Heating Load
Heating Load
Z2
Z3
PRIMARY PUMP
Z1 DHW
S OR
COLD WATER SUPPLY
HOT WATER SUPPLY TEMPERED
COLD WATER SUPPLY

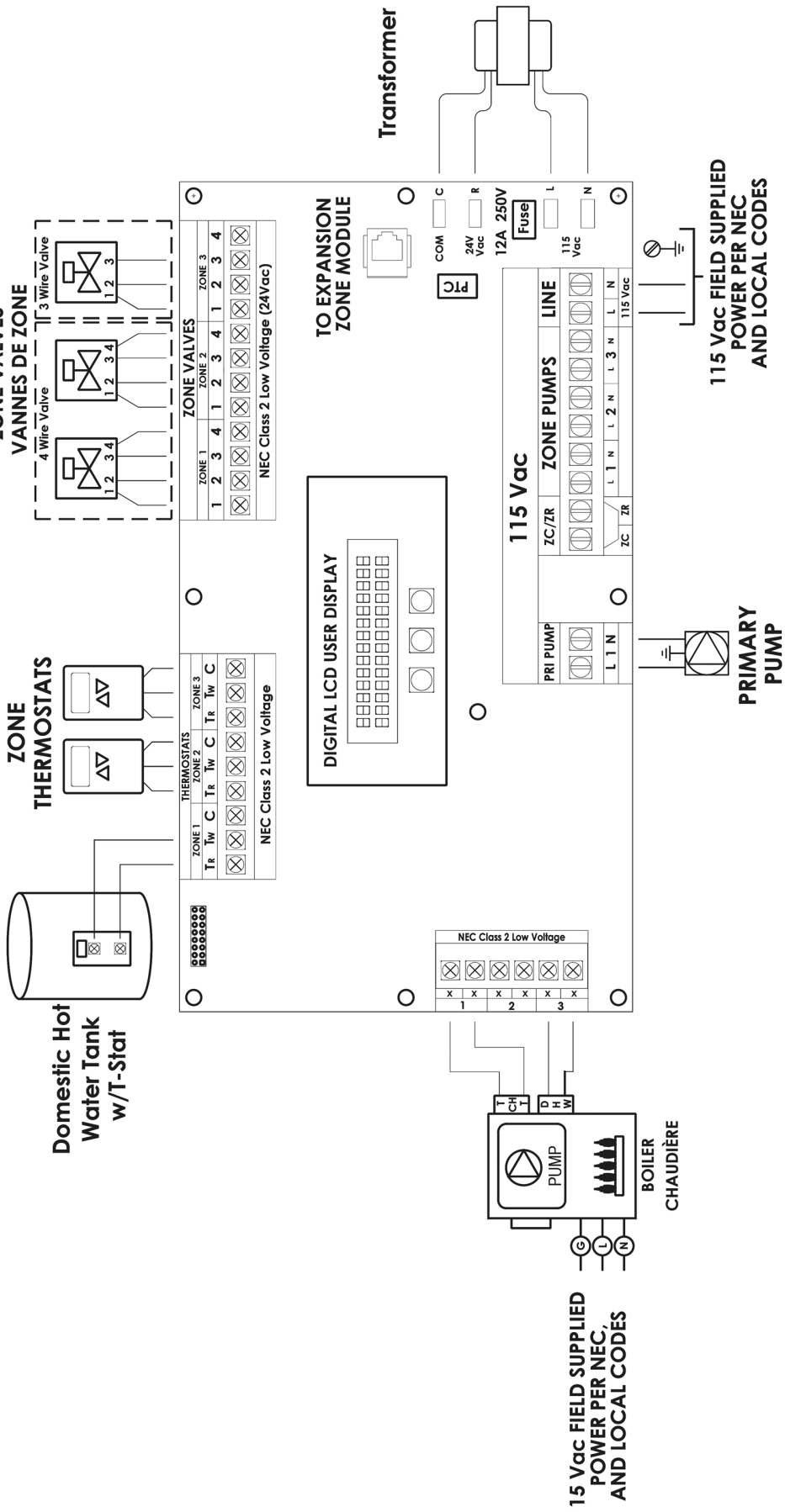
165 Indirect Zone Valve, DHW Tank, Tank Sensor



Reference zone control manufacturer instructions for details on setting priority if necessary.

If adding an indirect tank with ***sensor*** to a **Heating Only Boiler**, change P03 from 08 to 05. See Section 9, Parameter Settings in Boiler Installation, Operation & Maintenance Manual for details.

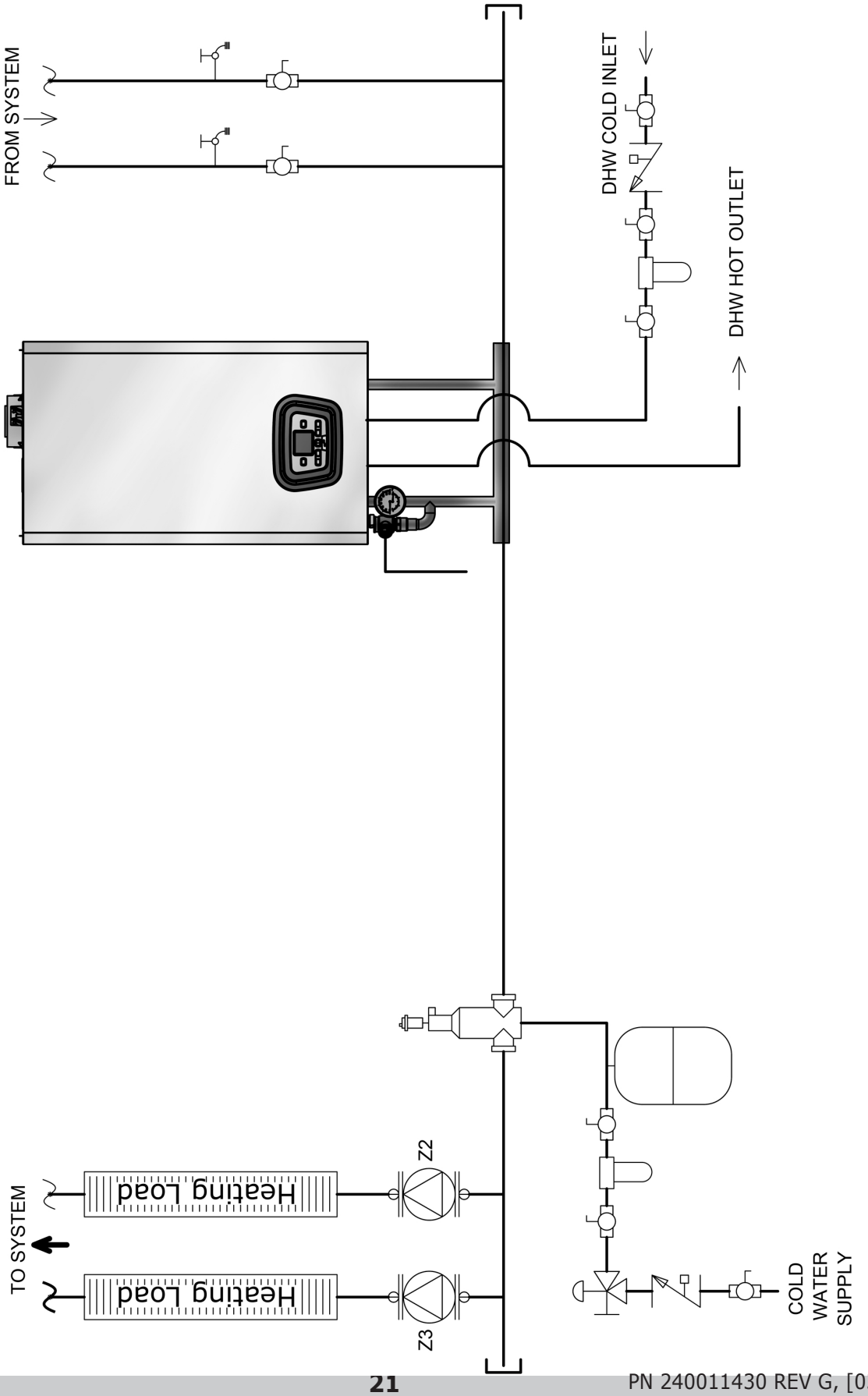
165 Indirect Zone Valves, DHW Tank, Tank T-STAT -Wiring Diagram



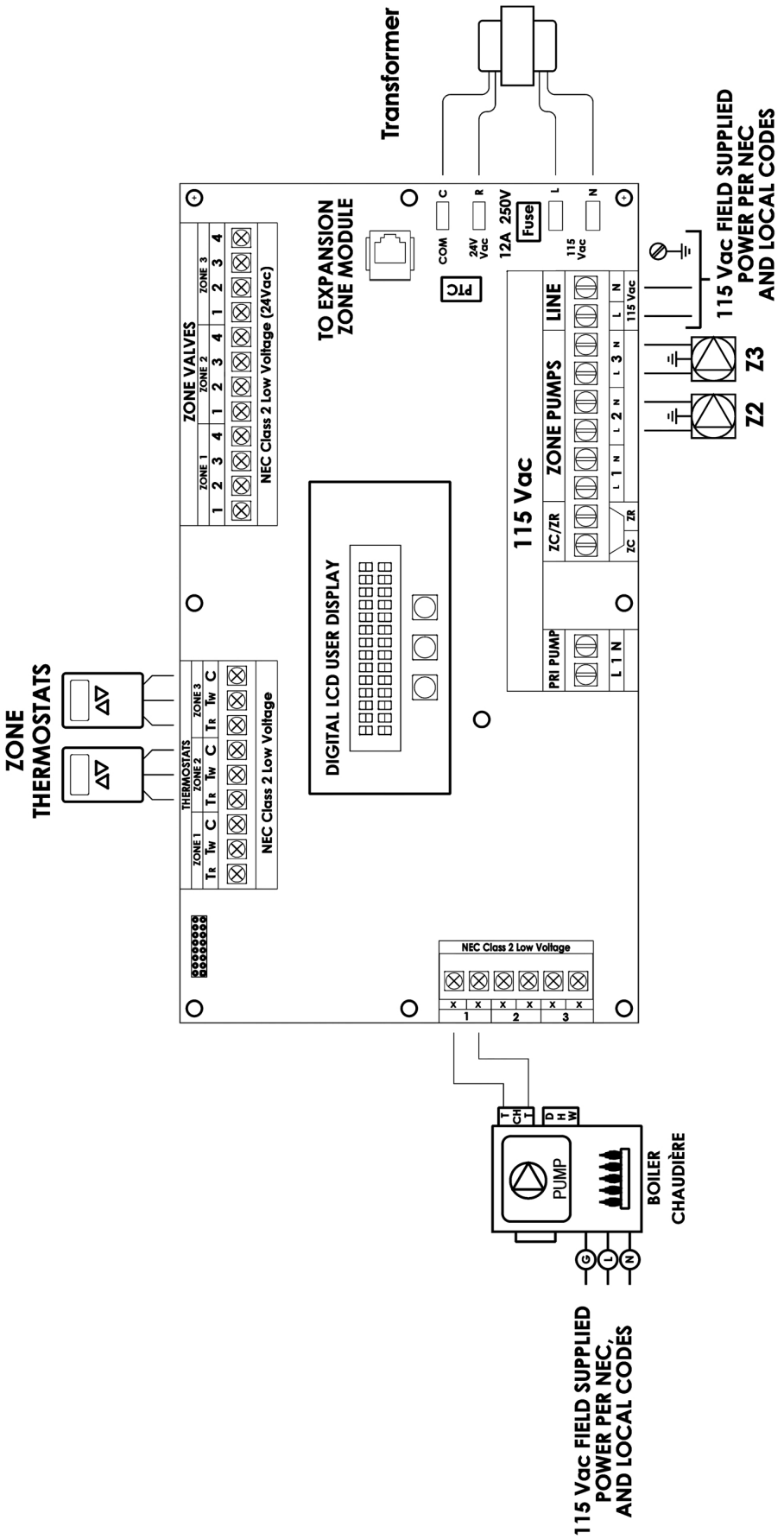
Reference zone control manufacturer instructions for details on setting priority if necessary.

If adding an indirect tank with ***Thermostat*** to a **Heating Only Boiler**, change P03 from 08 to 04. See Section 9, Parameter Settings in Boiler Installation, Operation & Maintenance Manual for details.

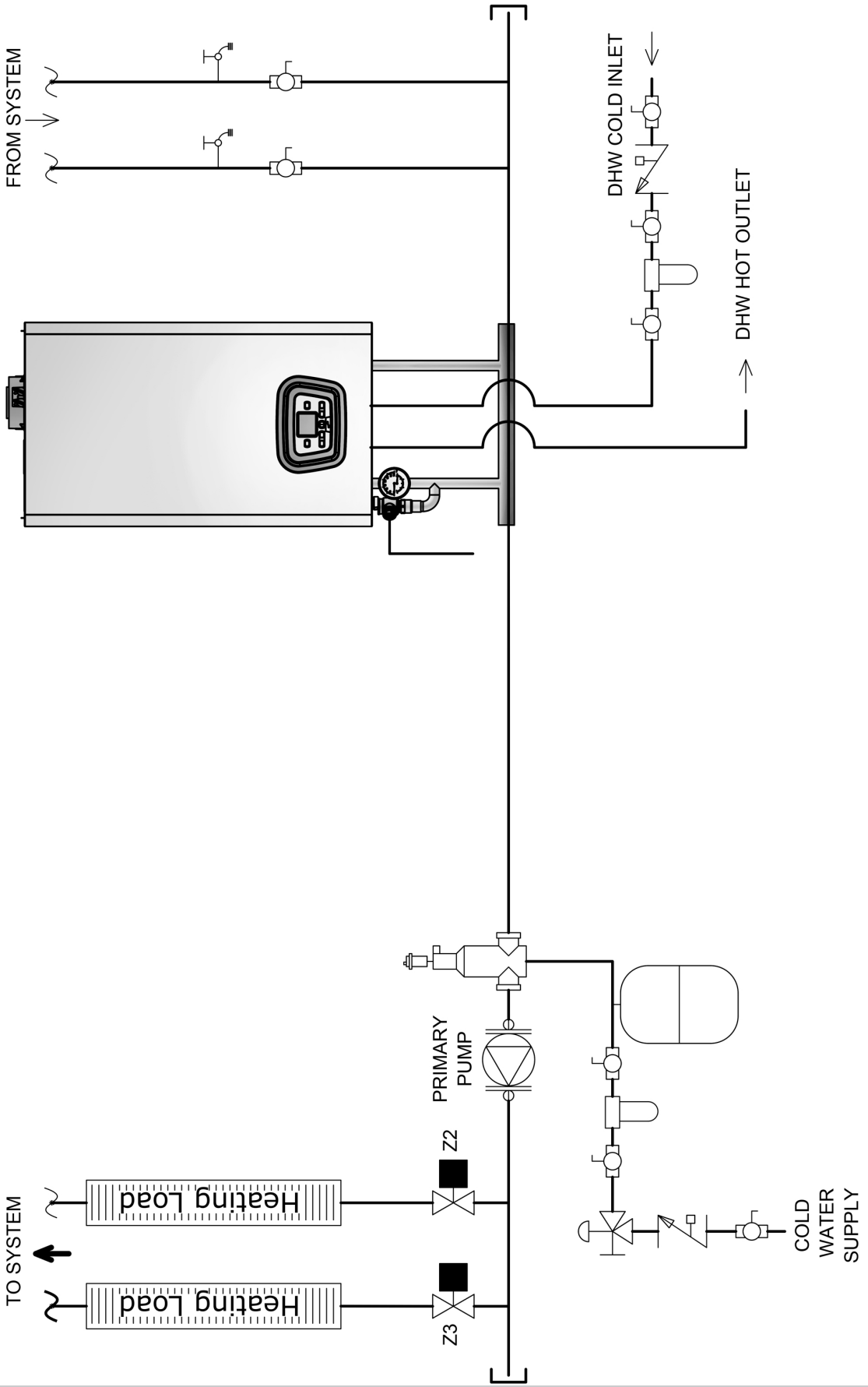
150/205 with Zone Circulator Pumps



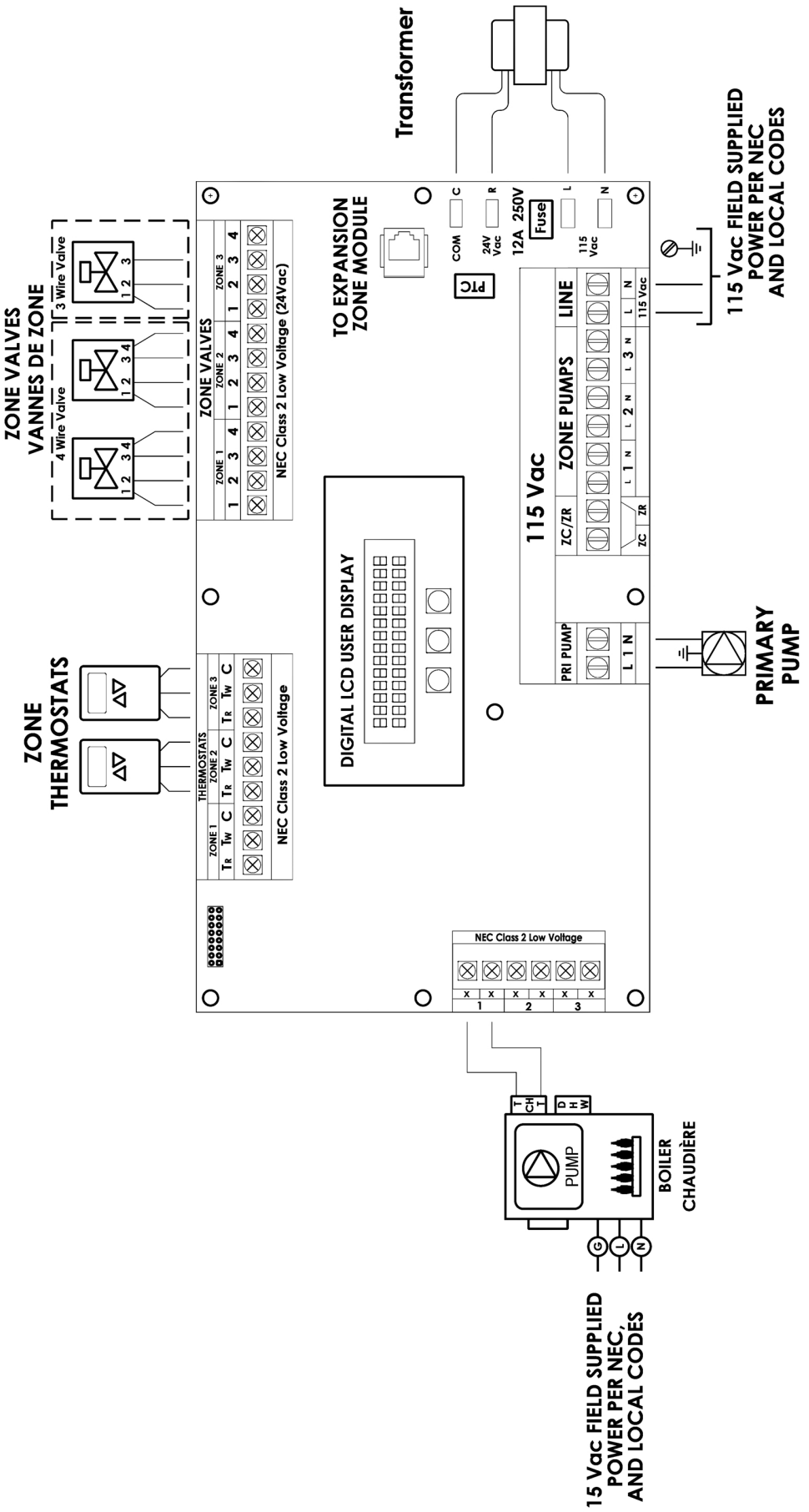
150 & 205 With Zone Pumps



150 & 205 with Zone Valves



150 & 205 With Zone Valves



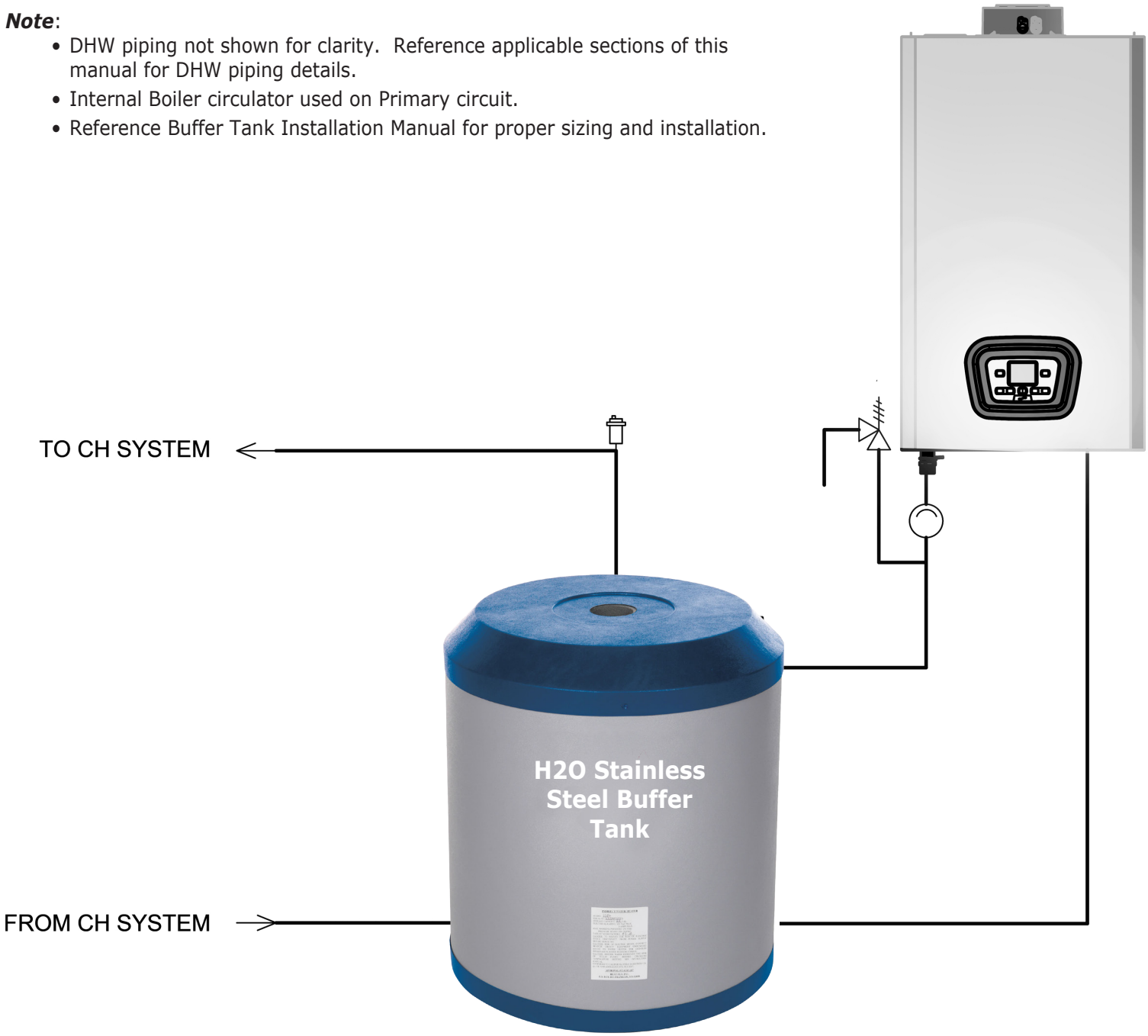
Low Mass Piping

When installing low mass systems, additional water mass may be required to avoid short cycling by the boiler. In these applications it is recommended that a buffer tank be installed.

Buffer Tank on Central Heat Circuit

Note:

- DHW piping not shown for clarity. Reference applicable sections of this manual for DHW piping details.
- Internal Boiler circulator used on Primary circuit.
- Reference Buffer Tank Installation Manual for proper sizing and installation.



Low Mass Boiler Wiring with Buffer Tank

Connect the buffer tank aquastat to terminals 6 and 7 on terminal block M2.

System wiring remains as shown in the previous wiring diagrams.

Optional Equipment

1. Outdoor Air Sensor, if used.

A. Boiler automatically recognizes sensor when used.

B. See Chart 1 for sensor data. Sensor part number BD710487302V

C. Locate outdoor sensor to protect against wind and direct sunlight. Mounting instructions provided with sensor.

D. Maximum wire length is 100 ft (30m) for 22 ga. wire, or 150 ft (45m) for 18 ga. wire.

E. Connect wires to M2 OUTDOOR SENSOR terminals 4 & 5. Wires are interchangeable. See Accessories.

2. Sensor for Indirect DHW Tank (Heating Only Boiler).

A. See Chart 2 for sensor data.

See Accessories section of this manual for wiring diagram.

CHART 1 - OUTDOOR AIR SENSOR DATA

T [°F]	R [Ohm]	T [°F]	R [Ohm]
-4.0	7,578	53.6	1,690
-2.2	7,193	55.4	1,621
-0.4	6,831	57.2	1,555
1.4	6,489	59.0	1,492
3.2	6,166	60.8	1,433
5.0	5,861	62.6	1,375
6.8	5,574	64.4	1,321
8.6	5,303	66.2	1,268
10.4	5,046	68.0	1,218
12.2	4,804	69.8	1,170
14.0	4,574	71.6	1,125
15.8	4,358	73.4	1,081
17.6	4,152	75.2	1,040
19.4	3,958	77.0	1,000
21.2	3,774	78.8	962
23.0	3,600	80.6	926
24.8	3,435	82.4	892
26.6	3,279	84.2	858
28.4	3,131	86.0	827
30.2	2,990	87.8	796
32.0	2,857	89.6	767
33.8	2,730	91.4	740
35.6	2,610	93.2	713
37.4	2,496	95.0	687
39.2	2,387	96.8	663
41.0	2,284	98.6	640
42.8	2,186	100.4	617
44.6	2,093	102.2	595
46.4	2,004	100.4	617
48.2	1,920	102.2	595
50.0	1,840	104.0	575
51.8	1,763	106.0	556

CHART 2 - INDIRECT TANK SENSOR DATA

T [°F]	R [Ohm]	T [°F]	R [Ohm]
32.0	32,505	86.0	8,060
33.8	30,898	87.8	7,726
35.6	29,381	89.6	7,407
37.4	27,946	91.4	7,103
39.2	26,590	93.2	6,813
41.0	25,308	95.0	6,537
42.8	24,094	96.8	6,273
44.6	22,946	98.6	6,021
46.4	21,859	100.4	5,781
48.2	20,829	102.2	5,551
50.0	19,854	104.0	5,332
51.8	18,930	105.8	5,123
53.6	18,054	107.6	4,923
55.4	17,223	109.4	4,732
57.2	16,436	111.2	4,549
59.0	15,689	113.0	4,374
60.8	14,980	114.8	4,207
62.6	14,306	116.6	4,047
64.4	13,667	118.4	3,894
66.2	13,060	120.2	3,748
68.0	12,483	122.0	3,608
69.8	11,935	123.8	3,473
71.6	11,414	125.6	3,345
73.4	10,919	127.4	3,222
75.2	10,447	129.2	3,104
77.0	9,999	131.0	2,991
78.8	9,572	132.8	2,882
80.6	9,166	134.6	2,778
82.4	8,779	136.4	2,679
84.2	8,411	138.2	2,583

Accessories:

1. Outdoor Temperature Sensor Kit - BD710487302V

Use Outdoor Sensor Kit with Heating Only or Combi Boilers. Wire Control to boiler M2 terminal strip terminals #4 and #5 as shown below.
Install/locate Control according to instructions supplied with sensor kit and Installation, Operation and Maintenance Manual (IOM).

Setting "**Kt**" Climate Curve:

Start boiler in CH mode. Depress CH control button once.

Boiler control will recognize installed OAS sensor. Display will change to show current default "**Kt"** value. Note display value.

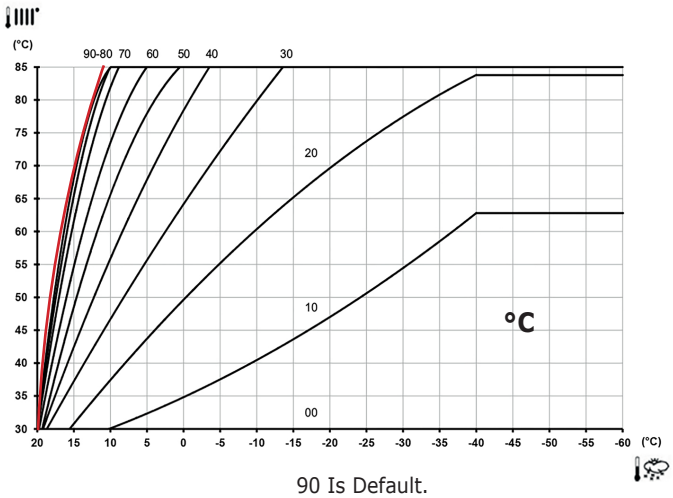
When operation in CH mode, **Kt** value setting will over ride maximum CH boiler control set point based on current outdoor temperature.

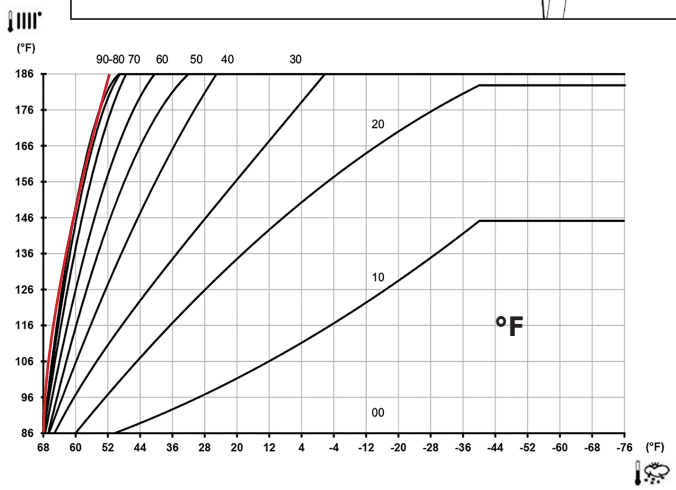
- Refer to applicable °F (or °C) chart,
- Identify **Kt** range that will satisfy the desired boiler delivery temperature based on average (extreme) outdoor temperature range expected for climate location.
- Use lower value of range as the desired **Kt** value.
  (example): to deliver 186°F water @ OT of -20°F = **Kt** range is 90 thru 25. Select 25.
- To change"default" **Kt** value on boiler control use +/- CH Heating buttons.

When scolling has stopped, boiler will automatically "SAVE" value as new **Kt** defalt value and automatically return to CH mode when no **Kt** adjustment activity is sensed. **Kt** values can be changed in +/- 1 point increments.

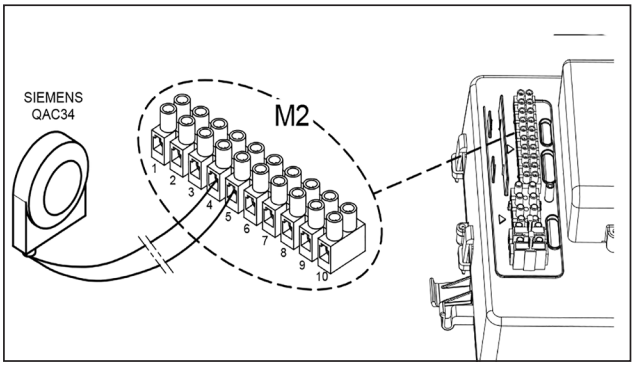
To return to check or change current **Kt** "default value - depress one of the CH setpoint adjustment buttons (once), while in any heating or standby mode. Adjust **Kt** value to obtain desired comfort level.

	Flow Temp		Outside Temp





90 Is Default.

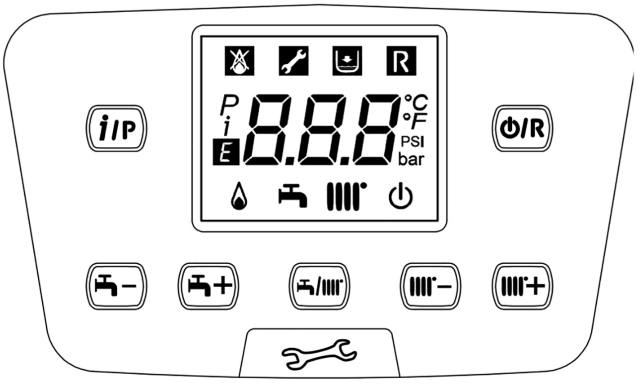


Note For temperatures below -40°F (-40°C), maximum heating flow temperature set point no longer increases and curves on the graph become horizontal.

BUTTONS Key

	DHW temperature adjustment *(+ to increase the temperature and – to decrease it)*
	Heating water temperature adjustment *(+ to increase the temperature and – to decrease it)*
i/P	Boiler operating information
	Operating mode: *DHW – DHW & Heating – Heating Only*
⏻/R	Off – Reset – Exit menu/functions

Boiler Control Panel



2. Indirect Storage Tank Sensor Kit

Heating Only boiler can be electrically connected to Indirect Storage Tank.

Diagram of hydraulic connection of external indirect storage tank is shown below.

Connect DHW priority sensor to terminals #9 and #10 on terminal block M2. The element of the sensor must be inserted in the sensor well located on the indirect storage tank.

Verify the exchange capacity of the storage boiler coil is appropriate for power of the boiler. Adjust DHW temperature (+95°F...+140°F / +35°C...+60°C) by pressing buttons on boiler control panel.

Note

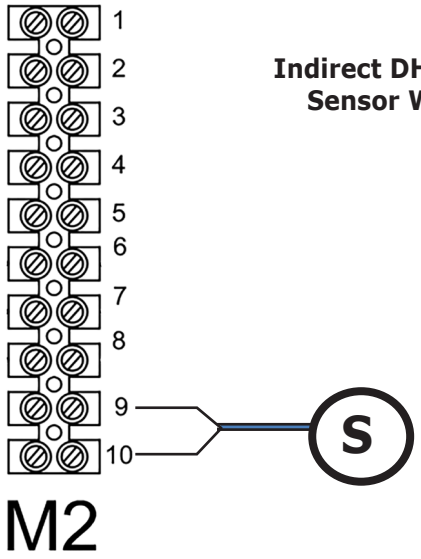
Parameter PO3 for **Heating Only** boiler, with no indirect tank remains Factory Set at 08. No change is required.

If adding an Indirect Tank with a sensor to **Heating Only Boiler** - change PO3 parameter from 08 to 05.

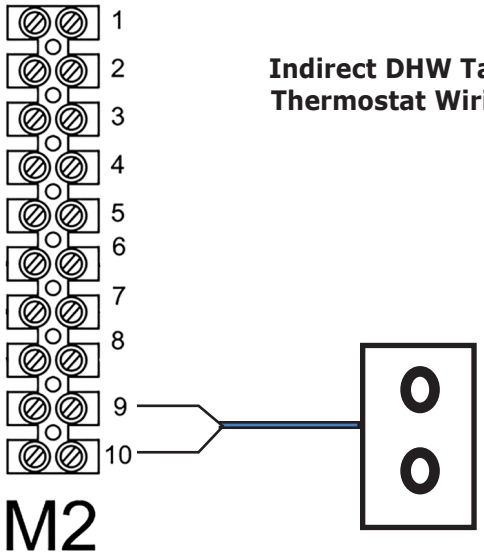
If adding an Indirect Tank with a thermostat to **Heating Only Boiler** - change PO3 parameter from 08 to 04.

See Section 9, Parameter Settings, in boiler's Installation, Operation, and Maintenance Manual.

Parameter PO3 for **COMBI** boiler factory set at OO requires no change.

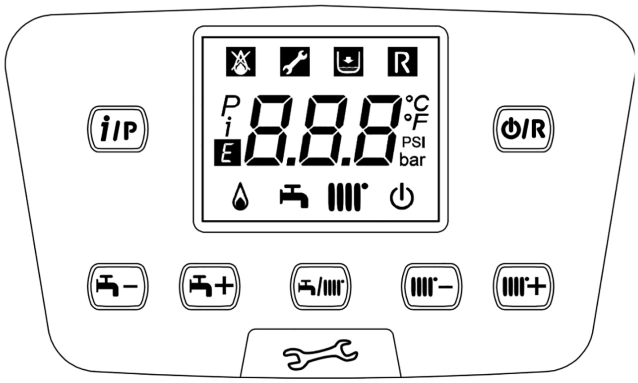


Indirect DHW Tank Sensor Wiring



Indirect DHW Tank Thermostat Wiring

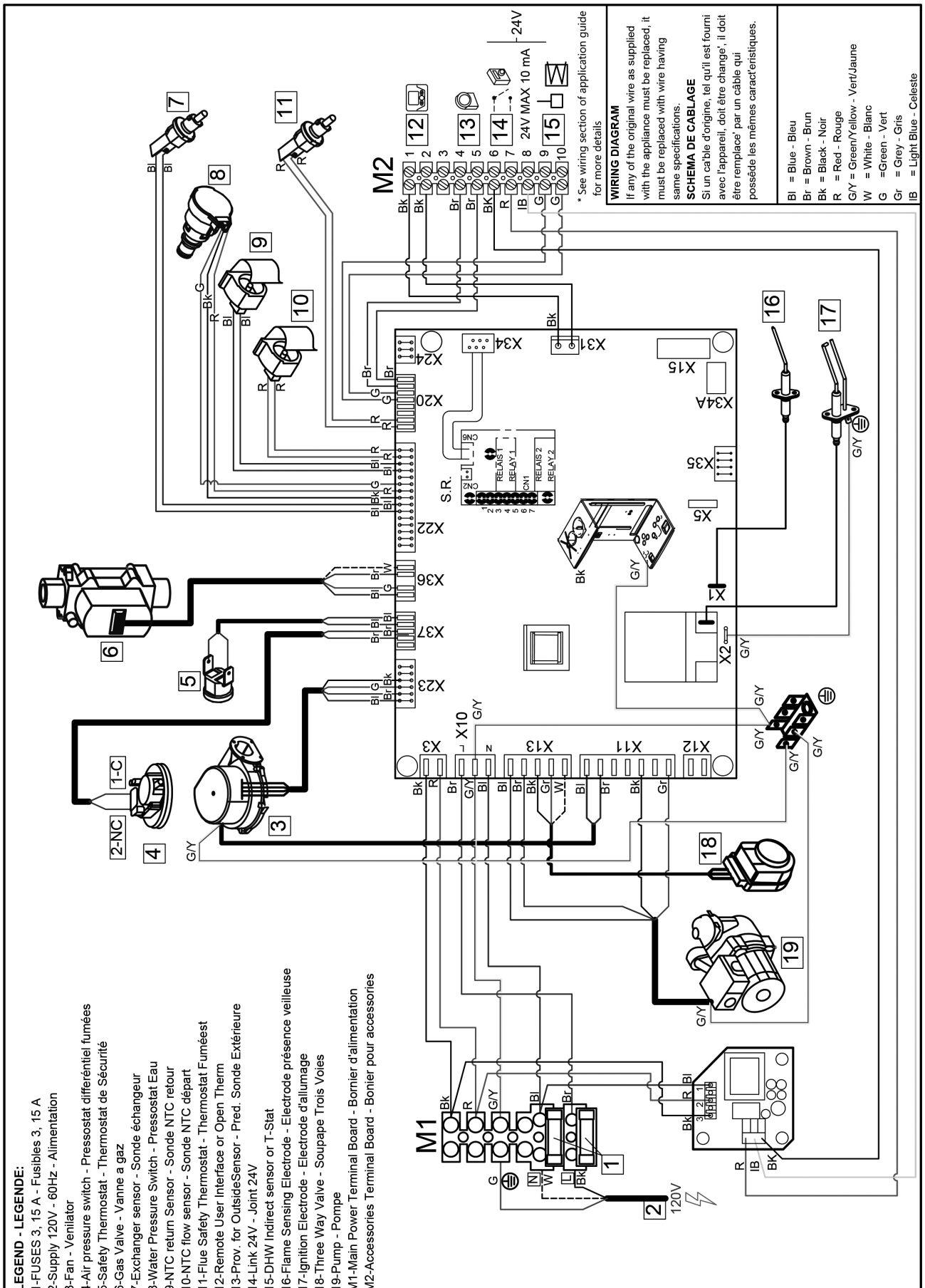
Boiler Control Panel



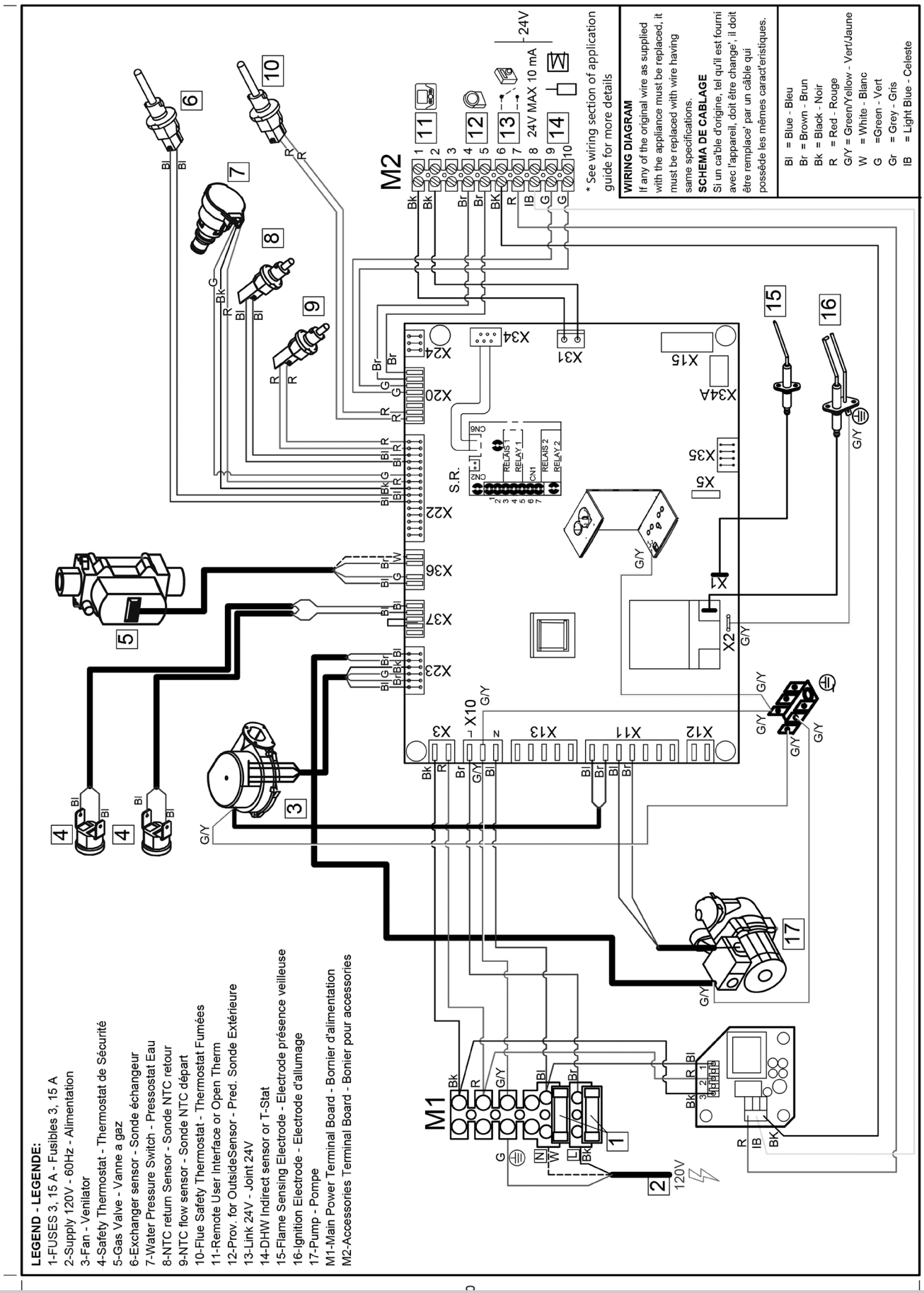
BUTTONS Key

	DHW temperature adjustment *(+ to increase the temperature and – to decrease it)*
	Heating water temperature adjustment *(+ to increase the temperature and – to decrease it)*
i/P	Boiler operating information
	Operating mode: *DHW – DHW & Heating – Heating Only*
⏻/R	Off – Reset – Exit menu/functions

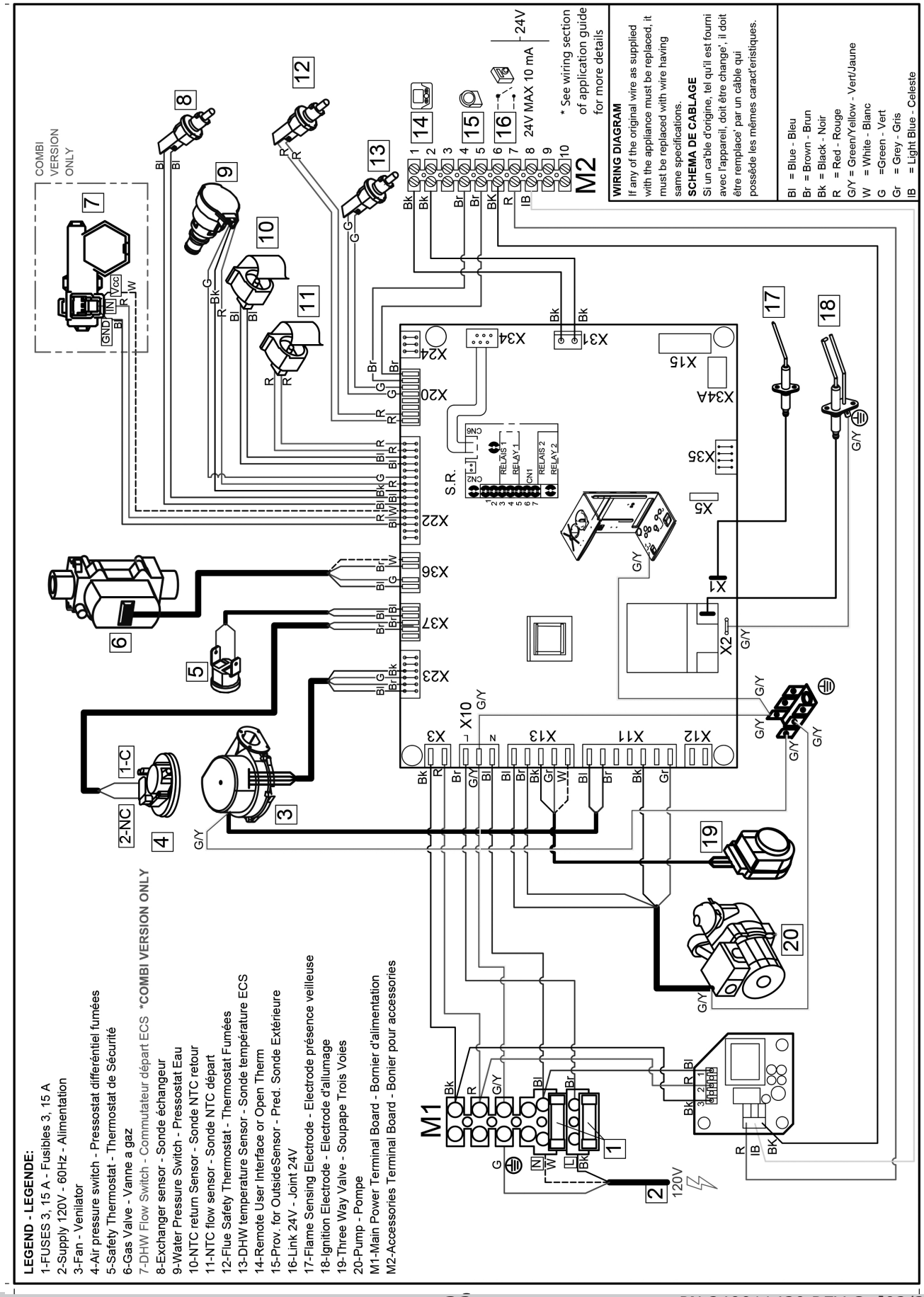
MODEL 125 - Heat Only



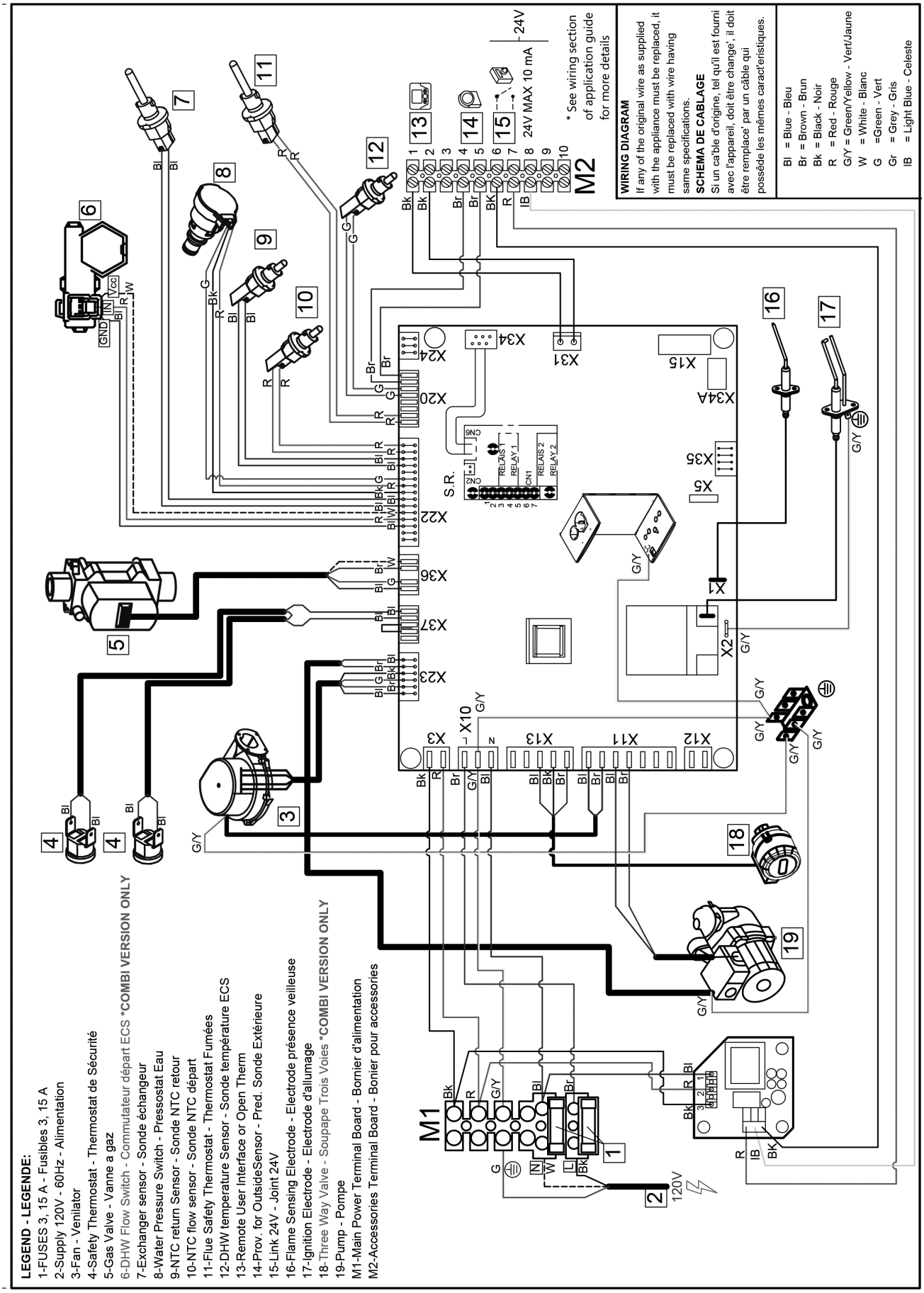
MODEL 165 - Heat Only



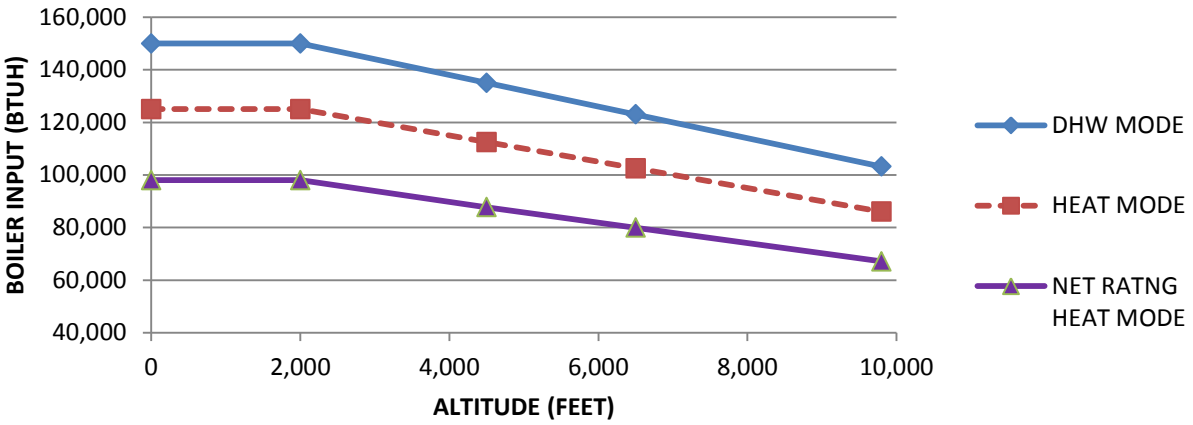
MODEL 150 - Combi



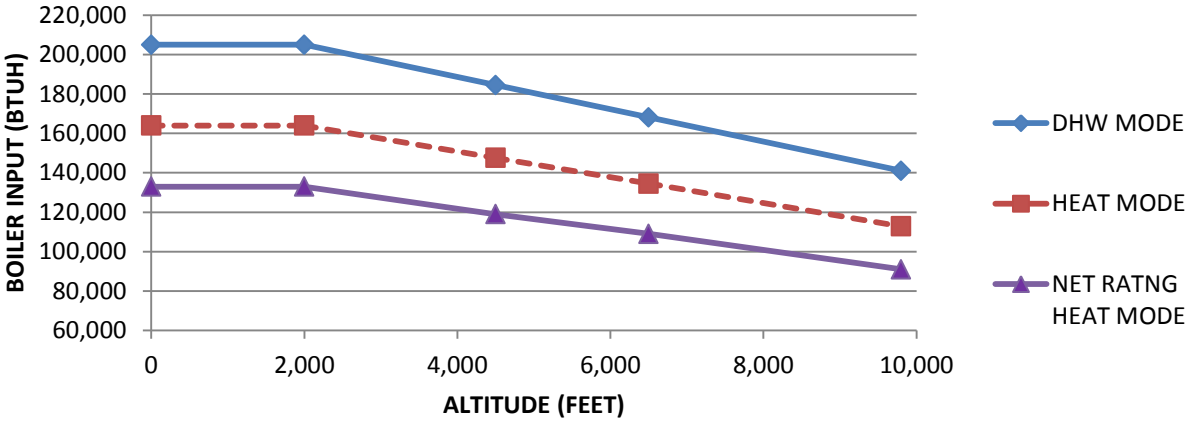
MODEL 205 - Combi



MODELS 125/150
CALCULATED EFFECTS OF HI-ALTITUDE ON BOILER PERFORMANCE



MODELS 165/205
CALCULATED EFFECTS OF HI-ALTITUDE ON BOILER PERFORMANCE



'HEATING ONLY' BOILER (125,000 BTUH)

		BOILER OUTPUT (BTUH/HR)			
		50,000	60,000	80,000	100,000
H2O30					
1st HOUR RATING (GAL/HR)	**140 F**	94	106	106	106
	115 F	119	138	158	158
CONTINUOUS RATING (GAL/HR)	**140 F**	67	79	79	79
	115 F	92	111	131	131
H2O40 / H2O40L					
1st HOUR RATING (GAL/HR)	**140 F**	103	115	119	119
	115 F	128	147	174	174
CONTINUOUS RATING (GAL/HR)	**140 F**	67	79	83	83
	115 F	92	111	138	138
H2O50					
1st HOUR RATING (GAL/HR)	**140 F**	112	124	133	133
	115 F	137	156	192	192
CONTINUOUS RATING (GAL/HR)	**140 F**	67	79	88	88
	115 F	92	111	147	147
H2O60 / H2O60L					
1st HOUR RATING (GAL/HR)	**140 F**	121	133	147	147
	115 F	146	165	208	208
CONTINUOUS RATING (GAL/HR)	**140 F**	67	79	93	93
	115 F	92	111	154	154

Notes:
176 °F Boiler Supply Water Temperature
AHRI Rating Conditions - 50 °F Inlet Water
@ 4.0 GPM FLOW RATE

Boiler output over 100,000 BTU does not effect tank performance.

Low Water Cut Off - Heating Only and Combi Boilers
These guidelines are supplied when necessary to install an additional Low Water Cut Off (LWCO), for sensing a low water level condition in a boiler, as required by the Authority Having Jurisdiction.

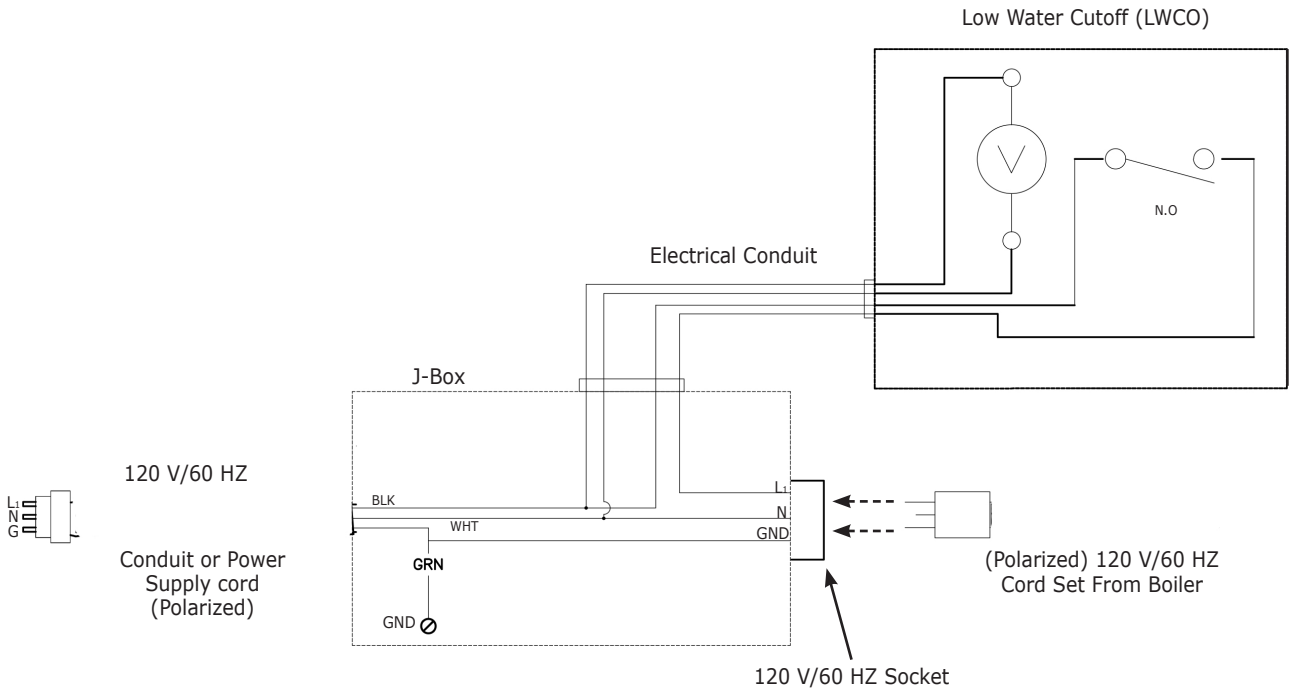
Follow LWCO manufacturer installation instructions for type of LWCO selected in addition to these instructions.

LWCO shall be 120V/60HZ control and dry contacts sized for load being connected. Wire control to boiler. See Figure 1.

Connect LWCO device to the system ground. Ground in accordance with the requirements of the authority having jurisdiction or, in the absence of such requirements, with the National Electrical Code (NEC) or Canadian Electrical Code CEC.

- Locate LWCO sensing device in the supply piping, above the minimum height of boiler. See Figure A-2, Piping Diagram.
- Position control in HORIZONTAL piping to assure proper boiler protection (upright or 90° rotation).
- For proper operation, sensing element of the LWCO control shall be positioned in the tee to sense the main water stream. Maintain minimum 1/4" spacing from pipe walls. Element shall NOT contact the rear, or side walls of the tee. See Figure A-3.
- Install an air vent using a tee to avoid nuisance shutdowns.
- Apply small amount of pipe sealant to threaded connections.
- Arrange piping to prevent water dripping onto boiler.
- DO NOT install water shutoff valve between boiler and LWCO sensing device.

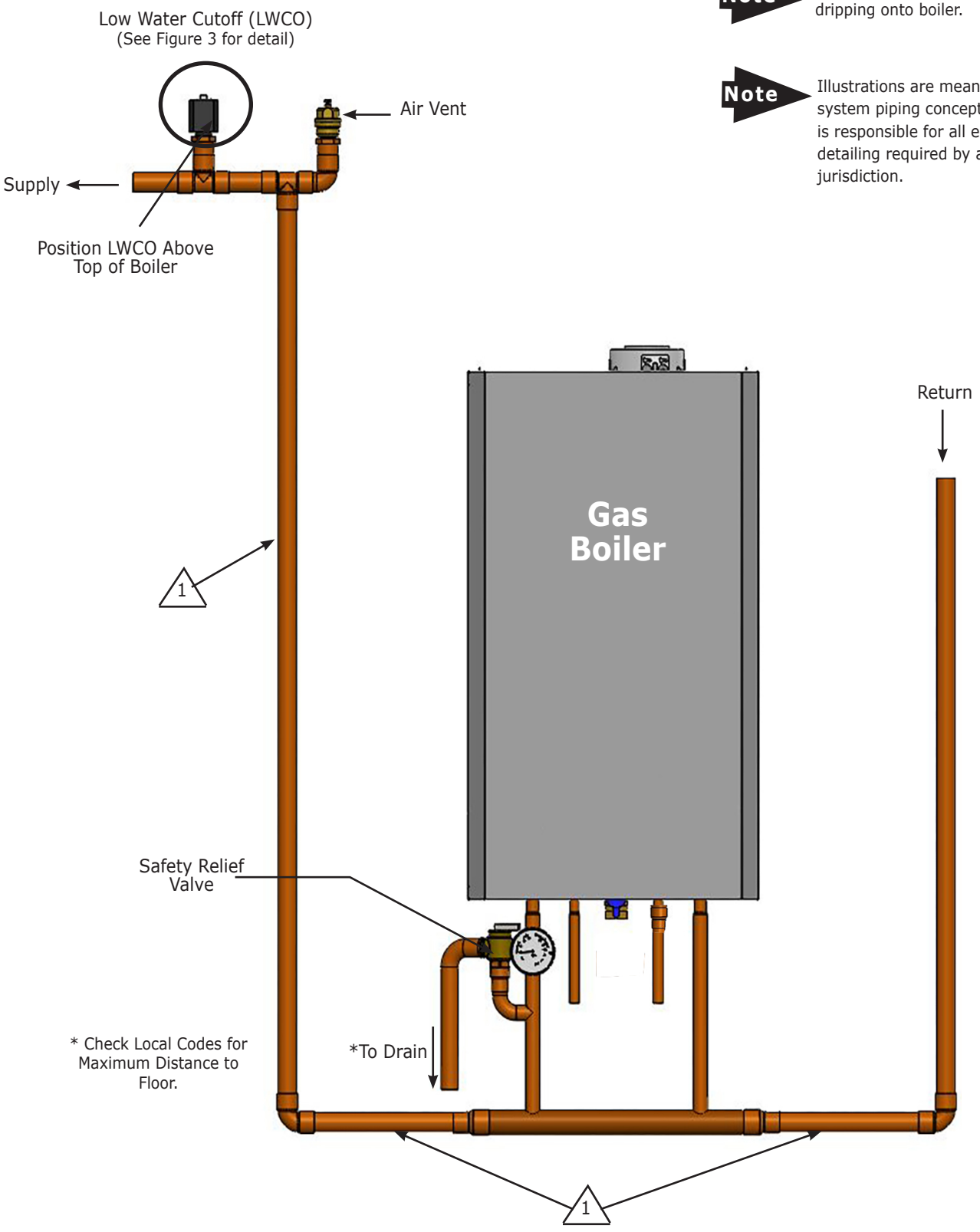
LWCO Wiring Diagram



Piping Diagram - LWCO Location

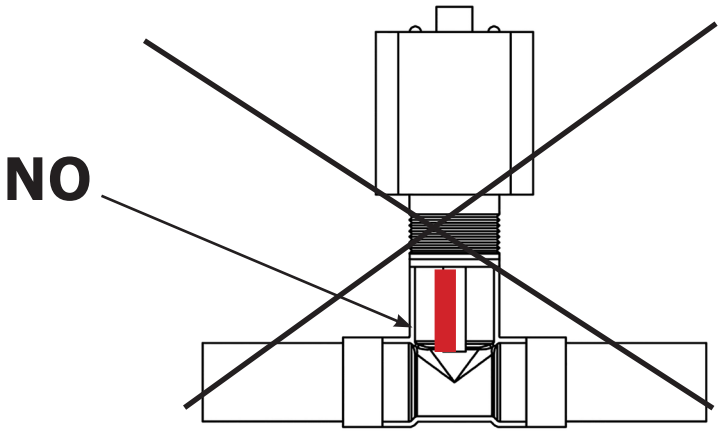
Note Arrange piping to prevent water dripping onto boiler.

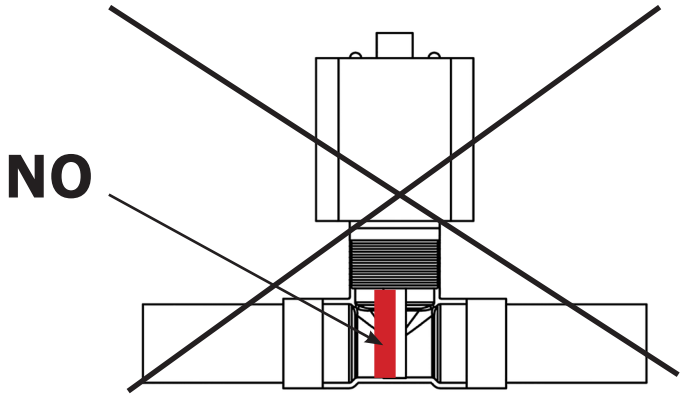
Note Illustrations are meant to show system piping concept only. Installer is responsible for all equipment and detailing required by authority having jurisdiction.

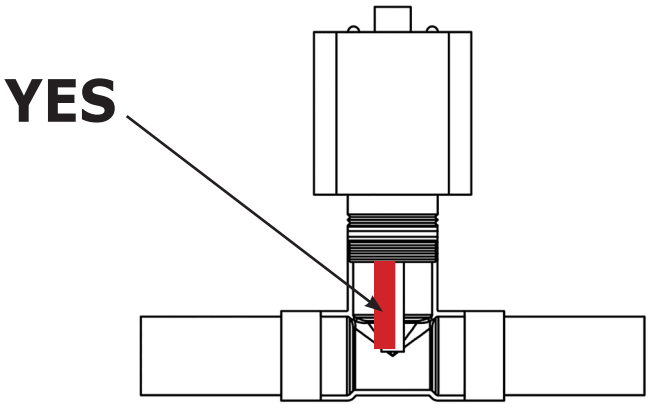


Note 1 DO NOT PLACE ISOLATION VALVE BEFORE TEE OR LWCO.

Low Water Cutoff - Detail







NOTES

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